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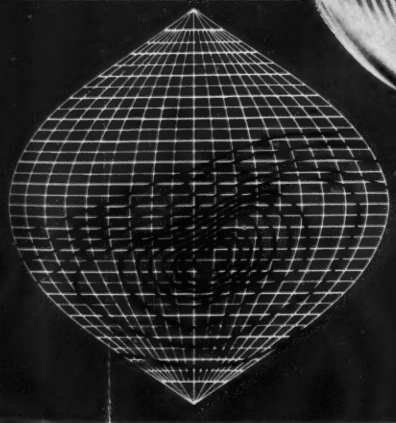

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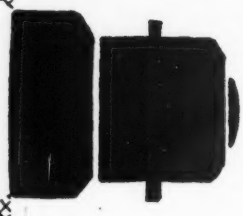

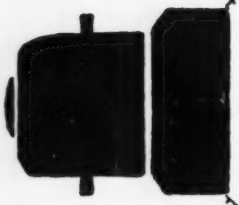

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Light and LIGHTING

Vol. 49. No. 11. November, 1956

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The State of Street Lighting

AS a great national newspaper recently averred, "there is no lack in this country of the technical knowledge to illuminate roads adequately at night, as many fine but isolated stretches of road testify." It may be that, taking the country as a whole, our street lighting is at least as good as, if not rather better than, it is in any other country. Nevertheless, there are all too many of our roads in which the lighting certainly does not suggest that we do not lack the "know-how." In fact, of course, the subtopian state of lighting in numerous streets is largely due to the fact that our pockets are not as deep as we would wish, and that, whether we wish it or not, they are largely emptied in financing projects thought to be likely to prevent the need arising once again for ARP street lighting. There are still technical problems of street lighting to be solved, and an international working party has now been set up for the study of these problems. But, what is more urgent than further research—unless it be as to how good lighting can be cheapened—is more rapid progress in lighting more of our streets to standards already agreed to be desirable.

Notes and News

ARCHITECTURE for lighting engineers—that is the theme of a series of four talks which John Reid has undertaken to give to I.E.S. members beginning on Wednesday, November 21. This is not to be an attempt to turn lighting engineers into architects in four easy lessons; the talks have been arranged in the belief that many lighting people, particularly the younger ones, would like to know something more about architecture. We gather that Mr. Reid will deal with the various styles of architecture and will explain how they have evolved leading up to the present day.

We think these talks, which will be quite informal, with plenty of opportunity for the audience to fire questions at the lecturer, will be welcomed by lighting engineers. John Reid is an excellent speaker apart from which he is an architect who knows quite a lot about lighting; he also knows the sort of things that lighting engineers want to know about architecture—and he thrives on awkward questions.

The talks, all of which will begin at 6.15 p.m., will be given at Holophane House, Elverton Street, Vincent Square, on November 21, 28, December 5 and 12.

Illuminated Sign Competition

Two years ago the Electrical Sign Manufacturers' Association held its first illuminated sign competition which attracted 93 entries. A second competition has now been announced for which eight prizes totalling £400 are available. The competition is for the best designs of illuminated sign displays on two buildings, a garage and motor showrooms, and a music, radio and TV store, specially drawn for the competition. Competitors may enter either or both buildings, each of which carries a first prize of £100. The competition is open to any individual and it is hoped that, as with the first competition, entries will be received from architects and designers as well as from people in the industry. To encourage younger designers and students there will be a special award of £25 for each building for the best entry from a competitor under 21 years of age. Designs will be judged on advertising value, architectural harmony, contribution to the improvement of illuminated sign display, day-time appearance, identification and directional value, and practicability—though not necessarily in that order. Entries will be judged by a panel of experts representing architectural, town planning and advertising interests.

Full details of the competition and copies of the rules and drawings of the two buildings may be obtained from the Electrical Sign Manufacturers' Association, 23, Bedford Row, W.C.1. The closing date for entries is January 31.

House of the Future

On show at the Tea Centre, Regent Street, recently was a mock-up of part of a house designed by Kenneth Capon, A.R.I.B.A., of Architects' Co-Partnership, for the magazine *House and Garden*. The house is freely planned on one floor and is intended to be built on 16 reinforced concrete stilts, with only a garage and a workroom/playroom at ground level.

To the layman, in spite of its many good points, enhanced at the exhibition and in photographs in the September and October issues of *House and Garden* by clever interior decor, the house seems poor value for money. It provides only about 1,000 sq. ft. of floor area, excluding the garage, the workshop, and an internal patio, for an estimated cost of £4,500—plus the price of the land and fees for professional services.

The living-room/dining-room is 21 ft. x 12 ft.—not much larger than the living-room of a council house—though there is also a 100 sq. ft. study/guest-room, which is separated from the living-room by a sliding partition. A 100 sq. ft. playroom is situated between the two children's bedrooms and there are two bathrooms, but it is necessary to pass through either the kitchen or a bedroom to get from the living-room to either of them.

Many of the problems which arise in the design seem to be the result of the architect's decision to include in the centre of the plan an open patio, which is enclosed on three sides by glass walls and acts, therefore, as a light well. It has, incidentally, a slatted floor, so that rain can drip through on to the garden below. Charming as this patio would be in fine weather, when it could serve as extra living space, nearly 200 sq. ft. could be added to the all-the-year-round usable area of the house by covering the patio with a glass roof (perhaps a sliding roof like those used in motor coaches) and by omitting the three glazed walls.

Only three lighting fittings were included among

the furnishings of the section of the house exhibited at the Tea Centre—a desk lamp and a wall bracket fitting in the study, and a fitting with an opal glass shade suspended in the centre of the sitting area of the living-room, with the shade only about 4 ft. above floor level. Built-in storage fitments and the kitchen would be lit by fluorescent lamps.

Electricity in the Home

The continuous urge toward higher living standards, reports a team of United Kingdom house-builders which visited the United States last autumn,* "has resulted in a great increase in the number and variety of electrical appliances in the American home." This will come as no surprise to readers who have heard before the estimate (now some years out of date) that the average U.S. household contains at least 70 electrical devices. As one observer interviewed by the team put it, "new houses in the U.S. tend more and more to become structures built around an amazing variety of electrical equipment."

It is not surprising that American recommendations for residential wiring systems are, by British standards, pretty generous, when one takes into account the fact that nearly all American homes are centrally heated (usually by hot air from natural gas or oil-fired furnaces) and that there is, therefore, no need to provide for electric heating appliances.

The minimum requirements of the U.S. National Adequate Wiring Bureau include, for example: a 100-amp. service entrance (equivalent at U.K. voltages to about 50 amp.); one three-wire or two two-wire 20-amp. branch circuits for each of the following: kitchen, laundry and dining area; separate circuits of the correct size for each appliance such as the following: cooker, food-freezer, room air-conditioner and clothes dryer; a 20-amp. general-purpose branch circuit for each 375 sq. ft. of floor area; and enough socket outlets so that no matter where there is a portable lamp or electrical appliance a 6-ft. length of flex will be adequate.

Although automation in the British home lags a good way behind the level it has reached in the U.S., far more attention might be paid in this country to recommendations such as those summarised above. There is no doubt that in Britain, too, more and more people are becoming gadget-minded, and every effort should be made to resist so-called "economy cuts." In the long run, inadequate electrical installations usually lead either to costly additions or to dangerous improvisations.

* The team comprised members of the Federation of Registered House-Builders; its report, "American Housing," is published by the National Federation of Building Trades Employers (2s.).

Measuring Visual Fatigue

There have been many attempts to find a quick and sure method of measuring visual fatigue. The matter is clearly of great importance to the lighting engineer because, while there can be no doubt that the fatigue experienced when performing a visual task is greatly affected by the lighting conditions, there is no generally accepted method of expressing this quantitatively.

Luckiesh and his co-workers in America used the rate of involuntary blinking of the eyes as a measure of visual fatigue and a number of investigations were made to test the validity of this procedure which, however, seems now to have fallen into disuse.

More recently it has been claimed that the "flicker fusion frequency" can be used. This is the lowest frequency at which the eye ceases to detect flicker in an intermittent light and the fatigue is measured by the lowering of this frequency which is found to follow the performance of an exacting visual task. A recent paper by two Swiss investigators, E. Grandjean and K. Bättig, published in the *Helvetica Physiologica Acta* (Vol. 13, p. 178, 1955), describes some work on this subject. In particular they found that, while the flicker fusion frequency was lowered by such work as counting dust particles under the microscope, or reading with one eye, it was not affected by severe physical work which did not involve a visual task. Their conclusion is that "the flicker fusion frequency can be used as a sensitive test to appreciate the stress of a worker engaged in a strenuous visual work," but a perusal of their paper may well leave the impartial reader with a feeling that further work on the matter would not be amiss.

In a recent German investigation of the effect of lighting conditions on the rate at which a moderately exacting task (actually bead-threading) could be performed, the fatigue experienced by the subjects was measured by the lowering of the highest musical pitch which could just be heard. This is normally of the order of 20,000 vibrations per second (middle A on the piano is 440). In the researches described in *Lichttechnik* for July, 1956, the lowering of the frequency was usually between 2 and 4 per cent. and this was taken as a measure of the visual fatigue experienced by the subject. The great advantage claimed for this form of test is that it is very quickly and easily made and does not affect the subject's vision in any way. The layman may, perhaps, be excused for wondering whether it is reasonable to measure fatigue due to the use of one of the special senses by an effect which is wholly confined to one of the others.

A.P.L.E. Conference, Blackpool

Report on the proceedings of the annual conference of the Association of Public Lighting Engineers.

Blackpool, the home town of this year's president of the Association of Public Lighting Engineers, Mr. Harry Carpenter, is closely associated in most minds with the world-famous illuminations for which he is responsible, and it is therefore not surprising that the Association should have decided to hold its twenty-seventh annual conference there.

The official opening took place on Tuesday, September 18, when Mr. J. M. Waldram, the retiring president, greeted the Deputy-Mayor of Blackpool, Councillor D. J. Johnson, who welcomed the members and delegates on behalf of the Mayor and declared the Conference open.

After expressing the thanks of the Association, Mr. Waldram said that just as Blackpool held a unique position among seaside resorts, so Mr. Carpenter held a unique place among public lighting engineers in that his activities were probably responsible for a not inconsiderable part of the town's prosperity. He then invested the new president with the chain of office.

Mr. Carpenter expressed his appreciation of the honour conferred on him and paid tribute to the work done by the retiring president, saying that the way in which Mr. Waldram had presided over the Association's affairs bore striking testimony to the integrity and wide vision of the manufacturing industry. He then announced that Mr. N. Axford, of the S.W. Electricity Board, had been elected vice-president for the year 1956-57.

The Presidential Address

The new president then delivered his address. He said that the papers to be read at the Conference would, from different aspects, study the development of public lighting to the present time and discuss possible future trends. He himself began this process, which he described as "stock-taking," by saying that it was rather disturbing to find that many of the problems which were discussed when the Association last met at Blackpool in 1932 were still awaiting solution. The cost of public lighting, however, had shown a remarkable decrease: the average cost for five Midland towns in 1932 was 0.8d. per lumen per inhabitant. The monetary equivalent of this to-day was 2.3d., yet recent statistics showed an average cost now of only about 0.4d. per lumen per head, a really remarkable reduction.

Road casualties, too, had decreased if expressed as a fraction of the number of vehicles on the road; especially gratifying was the absolute decrease in fatal accidents. How far this improvement could be attributed to better street lighting it was impossible to say, but it was significant that the number of street lamps in the country had more than doubled since 1932, while the standard of lighting had been appreciably improved.

Mr. Carpenter then went on to urge the need for improving the road system of the country, and said that the special concern of public lighting engineers was with the night-time efficiency and safety of the roads. This applied not only to main traffic routes, but to the much greater mileage of "other roads" as well. It had long been advocated that the lighting of main roads should be treated as a national matter and that there should be some form of Government subsidy. A reduction in the vast number of lighting authorities had also been urged. Reorganisation of the administrative system, said Mr. Carpenter, might bring advantages but not if it meant central control which tended to stifle the full expression of local views and interests. (This point was made again by Mr. C. C. Smith in his paper on Thursday.)

A plea was frequently made for greater uniformity in street lighting. Mr. Carpenter said that while this might well apply to the class and intensity of the lighting, and frequent changes of colour on traffic routes should be avoided, it would be most unwise to impose a general uniformity. Public lighting should be planned to suit the community, the locality and the particular application, and lighting specialists should have freedom of choice in providing the best solution.

Tariffs and Costs

Other matters mentioned by Mr. Carpenter were the desirability of more uniform tariffs up and down the country, accompanied by less diversity regarding the procedure for providing services and connections to the mains, and the need for manufacturers in the lighting industry to take full advantage of modern methods of production so that they could provide the best articles at a reasonable cost.

The importance of human relationships was not forgotten and Mr. Carpenter devoted several paragraphs of his address to this important subject. A provocative remark was that this decade would go down in history as one in which complacency had replaced a real sense of urgency, to the detriment of personal effort. Success, he said, must depend on an absorbing desire and determination to learn, to get somewhere, to do something and, above all, to do it well, and this brought him to the subject of training and a reference to the revision of the Association's diploma scheme.

"Ships and Shoes and Sealing Wax"

Towards the end of his address, Mr. Carpenter made a witty reference to his partner, the Walrus, in Alice's Looking-glass Land and during the course of his remarks he did indeed "talk of many things." He made a plea for support for societies, such as the A.P.L.E., which did valuable work in promoting a special branch of science or technology. He urged that there should be co-operation between civil

The retiring president, Mr. J. M. Waldram, investing Mr. Carpenter with the presidential insignia.

The Deputy Mayor and Mayoress of Blackpool and Mr. and Mrs. Carpenter.

The Deputy Mayor opening the indoor exhibition.

and lighting engineers at the planning stage of major schemes for making and altering important highways and road junctions. After some remarks about the great advances made in interior lighting during the last quarter of a century, he said that public lighting would inevitably have to follow the same trend. Soon, too, there might be more permanent outdoor decorative lighting to make towns gay and interesting and he referred to the imaginative "Sound and Light" spectacles which had proved so popular in France.

In conclusion, Mr. Carpenter said that he had tried to present a "balance sheet" to shareholders in the business or service of public lighting because he felt that such a review helped to provide a sure basis for future progress and success.

A vote of thanks to the president was moved by Mr. Axford and seconded by Mr. W. R. Stevens, who said that the address was provocative and stimulating and a challenge to public lighting engineers. While Mr. C. C. Smith would be saying later that they had already brought the street lighting of this country up to a standard second to none in the world, the president was now urging them to make it better still. The vote of thanks was carried by acclamation.

The Exhibition

The Deputy Mayor was then conducted by the new president on a tour of inspection of the exhibits. Lamps, fittings and small equipment generally were displayed in two rooms adjacent to the Winter Gardens ballroom, where the opening meetings were held; the display of columns and large equipment was staged on the Middle Walk of the Promenade. A description of the exhibits will be found on page 305.

Lamp Development

On Tuesday afternoon Mr. H. W. Cumming, who is well known to members of the Illuminating Engineering Society as an active research worker at the Siemens-Ediswan Laboratories, gave a most interesting paper entitled "Light Sources—New Developments and Trends." He dealt in turn with the various types of electric lamps, noting recent advances and indicating what progress might be expected in the immediate future. A specially valuable part of the paper was a series of tables giving the principal characteristics of some of the more recently developed lamps.

The first type of lamp to be considered was the carbon arc in which the chief advance had resulted from the demand for greater light output for stereoscopic and wide-angle projection systems. Loadings up to 15 kw. had been used and the author said that the upper limit was now set by the amount of light which could safely be passed through the film.

Filament Lamps

Turning to the tungsten filament lamp, Mr. Cumming referred to a number of recent improvements in the general service range. None of these was fundamental, but cumulatively they were of considerable value. He said that the marking and rating of lamps in lumens instead of watts had recently been re-introduced on the Continent. Much more striking advances had been made in special-purpose lamps, particularly those used in automobile headlights. New types of high-wattage, high brightness projector lamps were constantly being developed to meet new applications. For film studio work lamps operating at a colour temperature of 3,300 deg. K. were available in sizes up to 10 kw. A special projector lamp had been designed with its filament close to the bulb so that the optical system could collect more of the emitted flux. Mr. Cumming also showed the new 3 kw. signalling lamp with multiple filaments in parallel to give quick nigrescence. Another striking novelty mentioned was the concentrated 1,000-watt infra-red lamp in a fused silica bulb 10 in. long and about ½ in. in diameter.

Discharge Lamps

Mercury vapour discharge lamps were divided into two groups, *viz.*, those with glass envelopes and those operating at a higher pressure in a quartz envelope. A new member of the former group was the 1,000-watt lamp, with a tube of special hard glass and no outer jacket. In the latter group

two novelties were the "reflectorized" lamp, with an outer envelope carrying an internally deposited aluminium reflector, and the improved phosphor giving greater emission in the red.

The very high pressure, high brightness mercury lamp had not changed radically during the past 10 years, said Mr. Cumming, but he mentioned the introduction of a lamp of this type with xenon filling at a pressure of two atmospheres in addition to the mercury. The sodium lamp, too, had changed very little, but a recent development was the jacketless lamp (described in the August issue of *Light and Lighting*).

Xenon and Other Rare Gas Lamps

Mr. Cumming was naturally in a good position to bring his audience up to date as regards recent developments in the lamps depending on discharge through one of the rare gases, particularly xenon. He pointed out the many advantages of these lamps which offset their comparatively low efficiency of some 25 to 30 lm/W. In particular, it was possible to obtain very high values of luminance (up to 100,000 cd/cm^2) in light closely approximating in colour to natural sunlight.

As regards tubular fluorescent lamps, the author said that there was a marked movement towards uniformity throughout the world, with white lamps in three groupings of, respectively, a north sky light, sunlight and some warmer colour such as the new warm white introduced in this country fairly recently. He mentioned the reflectorised lamp, with the fluorescent material backed, on the glass side, by a highly reflecting material such as magnesium oxide over about 60 per cent. of the circumference of the tube, so that the luminance of the remaining segment was increased by some 75 per cent. The paper concluded with a brief reference to the electroluminescent condenser form of lamp.

Mr. Cumming presented his paper in shortened form and illustrated his remarks with a number of well-staged demonstrations.

Colour-corrected Mercury or Tubular Fluorescent?

The discussion was opened by Mr. E. H. Nelson who raised some eyebrows by his remark that lamp engineers were always glad to have the views of users regarding the lamps they produced. He said that the author had not mentioned the search now being actively undertaken for some more refractory material to replace tungsten. This would give an incandescent lamp of higher efficiency which might well displace the fluorescent lamp. He said that research was going on, too, with the object of improving the colour-corrected mercury lamp in various ways. The new silicate phosphors developed in this country responded to the short-wave as well as the long-wave u.v. He expressed the view that the xenon lamp had a number of disadvantages, among them the need for a much larger choke than that required for the mercury lamp. The high voltage required for starting was also a drawback.

Mr. Howard Long expressed the view that the fluorescent bulb lamp would soon oust the tubular lamp, while Mr. John Wilson, of Paisley, stressed the economic importance of reducing the proportion of invisible radiation from lamps.

Dr. N. A. Halbertsma said that in public lighting the life of a lamp was a very important matter. The discharge lamp was not only efficient in light output but its life of 4,000 to 5,000 hours, compared with the 1,000 hours of the tungsten lamp, was also a great benefit as far as maintenance was concerned. He advocated group replacement where colour-corrected mercury lamps were used.

Dr. H. H. Ballin said that lamps were being continually improved; it was seldom realised that a penny to-day would buy 13 times as much light as a penny in 1941.

Mr. H. M. Ferguson made an important point when he said that the size and shape of a lamp were very important to the fittings designer; if a lamp was of unsuitable shape there might well be an unavoidable loss of efficiency in the fitting.

Mr. C. Hughes said he was worried about the use of toxic powders such as arsenates, and he reminded his hearers of the beryllium scare of some years ago.

In a brief reply Mr. Cumming dealt with a number of the points raised by different speakers. In particular, he mentioned that the lumen maintenance of the colour-corrected mercury lamp was receiving a good deal of attention from the lamp engineer. He felt that the objections raised to the xenon lamp were all, fundamentally, economic in origin. The disadvantage of using toxic powders, mentioned by Mr. Hughes, was an additional argument in favour of the British silicate phosphors. A vote of thanks to the author was proposed by Mr. E. C. Lennox and carried by acclamation.

The Annual Luncheon

On Wednesday there were no technical papers. In the morning delegates visited the exhibitions and at mid-day they assembled in the Spanish Hall of the Winter Gardens for the annual luncheon. The chief guest was Mr. J. Eccles, C.B.E., Deputy Chairman (Operation) of the Central Electricity Authority and a past president of the Institution of Electrical Engineers.

The joint toast of the County Borough of Blackpool and the Guests was proposed by the Vice-President of the Association, Mr. N. Axford. In his reply the Deputy Mayor spoke in appreciative terms both of Mr. Carpenter's presidential address and of his work for Blackpool as its Public Lighting and Illuminations Officer.

The toast of the Association was then proposed by Mr. Eccles, who also expressed his admiration of the address which, he said, brought to his mind Pope's well-known words:—

"True wit is nature to advantage dressed,
What oft was thought, but ne'er so well expressed."

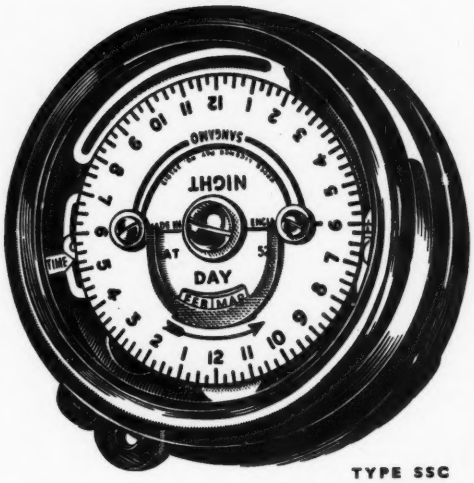
The striking reduction in the cost of the lumen, mentioned by Mr. Carpenter, was a wonderful tribute to the efforts of the lighting industry, which had a fine record both as regards the harmony it achieved between various competing interests and as regards its contribution to the export trade of the country. He urged that other towns should follow Blackpool's example in arranging displays which would attract visitors from overseas.

In his reply Mr. Carpenter mentioned that as far back as 1879 there had been a procession along the Blackpool Promenade on the occasion of the first installation there of public lighting by electricity. After quoting a witty "history" of electricity he said that he felt the A.P.L.E. had much valuable work to do in the future and the fact that the attendance at this Conference was again a record served as a happy augury.

Technical Films

The afternoon was occupied with a showing of three films, The first, entitled "Out of the Dark," traced the development of artificial light from the earliest times, while the second, "The Industrious Flame," showed how gas was used in many industries, prominent among them the electric lamp industry. The third film, "Electricity and Light," explained very lucidly the principles underlying the operation of various types of electric lamps, filament, arc and gas discharge (including fluorescent).

In the evening the delegates were taken for a coach tour



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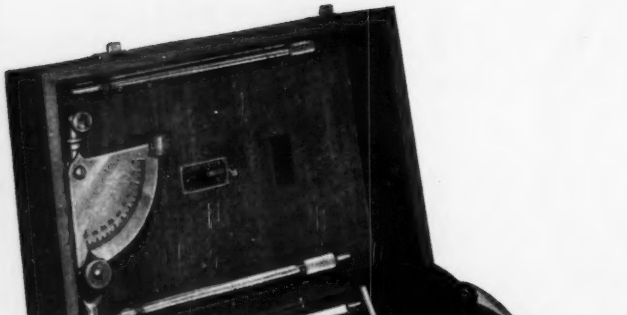

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and were shown the street lighting of Blackpool and the illuminations.

Street Lantern Design

On Thursday morning the Conference Session was devoted to a paper by J. G. Holmes and W. T. F. Souter on "The Development of Lantern Design." The first of the many photographs with which the paper was illustrated was reproduced from a recent issue of the *Architects' Journal* and showed a modern lighting fitting on a concrete column, side by side with a converted post-top panel lantern, both fronting a house in St. John's Wood. As the original article in the *A.J.* was headed "Outrage" it was natural to anticipate that the authors of the present paper would deal with their subject from the point of view of aesthetics and, perhaps, put up a spirited defence of the designer of contemporary street lanterns. In fact, the section of the paper headed "Aesthetic considerations" was less than one-eighth of the whole but it contained, nevertheless, some shrewd comments such as the following: "When a community deliberately spends some of its money on amenities, on museums and works of art, it should not spoil the living beauty of a street or building by ill-considered economies in the associated street furniture; one can sympathise with those who get so annoyed when the enduring beauty of an eighteenth-century building is spoilt by the proximity of an incompatible twentieth-century design, no matter how good the contemporary design may be."

Historical

The first part of the paper showed how lantern design had developed with the technique of street lighting and how, in particular, it had been influenced by the introduction of new light sources. In the twenties the light available was very scanty and attention was concentrated on getting as much as possible on to the roadway. This was the period of the original B.S. Specification with its emphasis on test point illumination. The introduction of the discharge lamps, mercury in 1932 and sodium a year later, changed the picture and considerable ingenuity was applied to the problem of distributing the more plentiful light so as to obtain reasonable uniformity of brightness over the road surface. In 1937 the M.O.T. Report evidenced this change of outlook by using the amount of light from the lantern as one criterion and by providing for a definite spatial arrangement of lanterns in terms of height and distance. At the same time research, mainly by the manufacturers of lamps and lanterns, brought about a marked raising of the standard of street lighting in this country and this advance was reflected in the recently issued B.S. Code of Practice.

The B.S. Code

At this point the authors threw out a challenge. "Street lighting," they said, "is no longer a matter of science or ingenuity. The choice of lamp type is a matter of local policy; the choice of lantern is a matter of economics; the rest is done according to the book"; and they added, "we now have an unexciting uniformity of moderately good street lighting installations."

The lengthy section of the paper dealing with technical requirements took the form of a commentary on a series of "relationship diagrams" displaying respectively the principal factors in lantern design, the types of light source to be accommodated in the lantern, the types of lighting to be provided, the optical components employed in lantern design, the constructional details, and, finally, the factors affecting the life of the lantern and the ease of maintenance.

After this the authors allowed themselves some flights of fancy as regards probable future developments. They sketched a specification for the ideal lamp and said that the most promising type available at present (apart from the xenon arc, which was prohibitively expensive) seemed to be the colour-corrected mercury lamp. With regard to the mechanical design of lanterns, they looked forward to a construction which would so protect the lamp that the maintenance period would be identical with lamp life. As to the ideal light distribution, they said that there was need for more authoritative guidance. They suggested a compromise between the British tendency to favour a high-angle-beam or a medium-angle-beam distribution giving a high road surface brightness, and Continental practice which favoured cut-off lighting without any appreciable glare.

Cost versus Quality

Opening the discussion, Mr. H. E. G. Watts endorsed what the authors had said about the tendency of local authorities to accept the lowest tender without due regard to quality, and this point was taken up again by a number of speakers, in particular Mr. R. Stevens and Mr. C. Bicknell, who said that a lantern which was expensive to maintain was an expensive lantern whatever its price.

Mr. F. H. Pulvermacher thought that a major deterrent to the use of the colour-corrected mercury lamp was its prohibitive cost. Saying that there was very little demand for a high-wattage sodium lamp, he pointed out that improvements in the efficiency of the 400-watt lamp had already brought its lumen output over the maximum of the range laid down in the Code of Practice.

Mr. A. G. Penny, and a number of other speakers, asked for more experimentation in street lighting. He said that conditions on the roads were changing; for instance, in heavily trafficked urban streets the road surface ceased to be important because the driver seldom saw it.

Professor N. A. Halbertsma followed up this suggestion by remarking that in the Netherlands when a large scheme of street lighting was being planned, some 5 to 10 per cent. of the estimated cost was devoted to experimental work. He urged that lantern designers should pay more attention to the production of lanterns with two lamps instead of one. This plan enabled lighting to be halved at midnight very easily, and it reduced the inconvenience caused by the occasional lamp failure.

Mr. S. S. Beggs disagreed with the authors when they said that street lighting was now a matter of routine. Skill and experience were still needed to solve many of the problems which arose from time to time.

The proliferation of lanterns of different kinds was deplored by Mr. J. R. Brodie and by Mr. R. B. Steventon, both of whom pointed out that when a new installation was approved the capital cost had frequently to be spread over 10 or 15 years, whereas nowadays an installation was out of date in less than five years' time. Mr. Steventon referred to a competition with a street-lighting theme which was being organised by the Institution of Municipal Engineers.

Mr. U. G. Allender returned to the subject of experimentation and said that it would be very useful if all local authorities could be informed when a particular authority was carrying out trials of some system of street lighting; they could then all profit by the experience gained during the course of the work.

Mr. G. W. A. Illingworth urged that designers should keep constantly in mind the need for ease of maintenance on site, while Mr. L. R. Osgood paid tribute to the manufacturers for the great advances in this respect which had been made in recent years.

After Mr. Souter had replied to the various points raised during the discussion, Mr. J. M. Ward underlined what had been said about the need for attention to quality and not to price alone. He then proposed a vote of thanks to the authors, which was carried by acclamation.

Looking Backward, Looking Forward

Mr. C. C. Smith, the City Lighting Engineer of Liverpool, was the speaker at the conference session on Thursday afternoon. He took as his subject "Street Lighting in Great Britain, Past, Present and Future," and began with a short account of early attempts at public lighting, quoting, *inter alia*, resolutions of the City Council of Liverpool passed in the middle of the seventeenth century. Although, as cities grew, the attention paid to the matter naturally increased, chiefly with a view to the prevention of crime, it was not until the beginning of the nineteenth century that street lighting could really be said to have begun. Starting from this period, Mr. Smith described the developments which had taken place both administratively and technically. The first milestone was the Lighting and Watching Act of 1833, which extended the provisions of an Act passed three years earlier, both of them being "adoptive" Acts. Any local authority which chose could adopt the Act and by doing so it acquired powers to light the streets in its area and to levy a rate for this purpose. The next big step forward was the passing of the Public Health Act of 1875, which was not adoptive but squarely empowered all urban authorities to light their streets and public places. The Road Traffic Act of 1934 gave county councils powers to light county roads and a similar power with respect to trunk roads was given to the Minister of Transport by the Trunk Roads Act of 1936. Mr. Smith mentioned a number of other Acts relating to public lighting, but these four were outstandingly the most important.

The technical development of street lighting began, said the author, with the work of A. P. Trotter at the turn of the century. For many years the design of street lighting tended to follow the methods used for planning the lighting of buildings and it was this "foot-candle approach" which led to the first milestone in technical development, the original B.S. Specification of 1927, with its classification of streets by the "test-point illumination."

Only five years later the subject was revolutionised by the introduction of the discharge lamps, first mercury and then sodium, with their high efficiencies and long life. Much fresh thinking ensured and the conception of silhouette vision caused the emphasis to shift from illumination to the brightness of the roadway. The new ideas were, to a certain extent, codified in the M.O.T. Report of 1937.

The Present

Turning to present-day standards, Mr. Smith said that, while by no means all that could be desired, the standard of street lighting in this country could bear comparison with that anywhere in the world. For traffic routes it seemed as though sodium was the most popular light source, although there were many excellent installations using other types of lamps. Where colour was important, as in shopping areas, fluorescent lighting was gaining ground rapidly. In such areas, seeing was by direct illumination and not by silhouette and optical control in the lantern ceased to be essential. For side roads, tungsten lighting was still predominant and again careful optical control of the light was not needed. Mr. Smith concluded this section of his paper with some statistics of the relative mileages of streets of different classes lit respectively by gas and by electricity.

The Future

Too wise to venture on much prophecy, the author contented himself with noting certain trends. Administratively he foresaw fewer and larger lighting authorities and increased financial assistance from the Treasury. As would be expected, he put in a strong plea that there should be no central control that would extinguish local powers or individuality.

Technically he envisaged the continued growth of fluorescent lighting, with improvement in the aesthetic appearance of the fittings. He mentioned radio control as an interesting possibility and referred to the very important part played by the road surface in any lighting scheme. This, he said, required far more attention than it was receiving. Returning to the subject of aesthetics in his concluding paragraph, he said that the main object, in his opinion, was not necessarily to insist that all equipment used should be that approved by some august and no doubt very competent body, but rather to promote and encourage thought on the subject so that never again would equipment be erected in our cities, towns and villages without a thought as to its suitability and appearance in its particular environment.

Who Should Control Public Lighting?

Mr. G. W. A. Illingworth opened the discussion by suggesting that with sodium lighting the motorist was less distracted by extraneous lights than he was in the case of a mercury installation. He said that optical control in a Group B installation was not only unnecessary but it was actually disadvantageous because of the glare caused.

Dr. H. H. Ballin reiterated the plea made during the discussion on the paper by Holmes and Souter for more experiments in street lighting and the same theme was taken up later by a visitor from Denmark. Support for the author's views came, too, from Mr. B. C. Ossitt, on the subject of financial assistance to small authorities, and from Mr. G. K. Lambert on the need for more consideration of the effect of the road surface on a lighting scheme.

Mr. C. Bicknell drew a somewhat alarming picture of the chaos which might result from interference if radio control were introduced, but Lt.-Cmdr. E. J. Cook thought any such difficulties could easily be surmounted.

Professor Halbertsma mentioned the international conference being held on the subject of urban express roads. He said that such roads would require the provision of a high illumination, probably of the order of 5 lm/ft^2. He supported the lighting of dual carriageways by means of lanterns mounted on the central reservation.

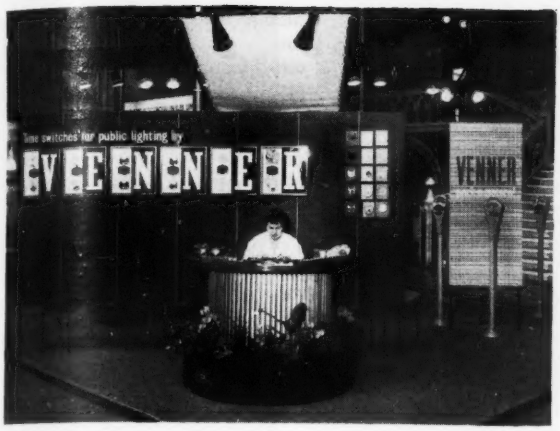
A suggestion from Mr. D. R. Brodie that public lighting should cease to be the responsibility of the borough engineer, but should be controlled in the same way as the fire and police services, brought Mr. Granville Berry to his feet. He reminded the meeting that the only body at present conducting an examination in street lighting was the Institution of Municipal Engineers.

During the course of his reply to the discussion Mr. Smith made it clear that in his opinion centrally mounted lighting, whether over the reservation in a dual carriageway or suspended over an ordinary street, should always have a cut-off distribution. He added the interesting remark that if an attempt were made to increase the capacity of our road system by spreading the load more evenly over the 24 hours, street lighting would become even more important than it was to-day. The vote of thanks to the author was proposed by Mr. Pryce-Jones.

At this meeting the president referred to the fact that the Council of the A.P.L.E. was anxious to recommence issuing the bulletin of information on street lighting installations which had proved so useful before the war. They had therefore sent a questionnaire to all lighting authorities. The information which had been received in reply was far from complete and he appealed to all local authorities for their co-operation in the matter.

Public Lighting Trends in Europe

On Friday morning the speaker at the final conference session was Prof. N. A. Halbertsma, well known to readers of *Light and Lighting* as a past President of the International Commission on Illumination and now Adviser on Road



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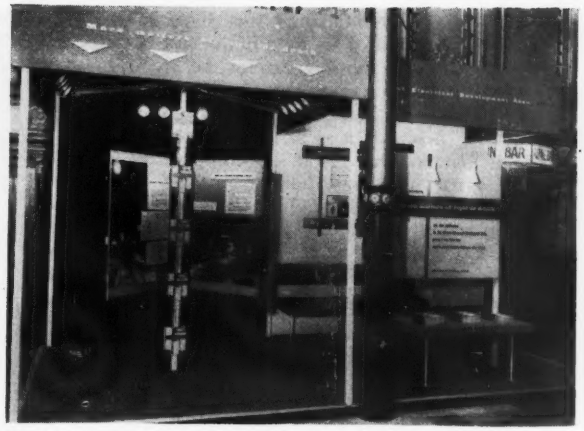
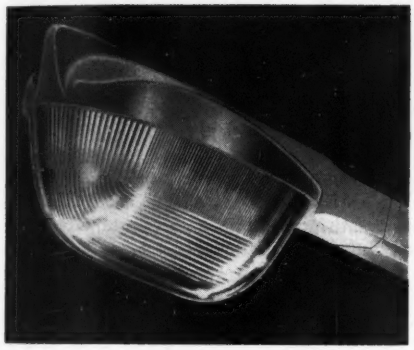
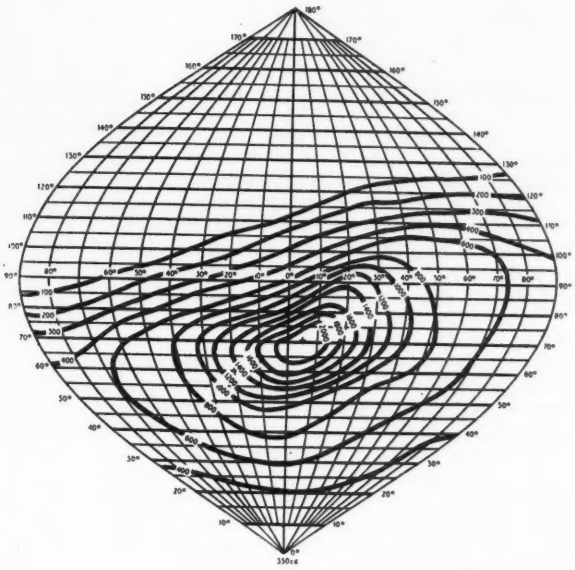


British Electrical Development Association stand.



Holophane 22/4257D refractor with, right, 150-candle diagram taken using 250-watt MBF/U lamp.



General view of outdoor display.

Lighting to the Government of the Netherlands. He gave an excellent account of "The Continental (Europe) Trend of Public Lighting," devoting by far the greater part of his paper to the growing use of fluorescent lamps for street lighting. He maintained, however, that for the lighting of main roads, these lamps were inferior to the sodium lamp. He said that as the result of comparative experiments recently carried out in Holland, it was concluded that neither of the two types of fluorescent lamp (the low pressure tubular and the high pressure colour-corrected) could rival the sodium lamp in a cut-off reflector, partly because of its economy and partly because it produced less glare and better visibility on the roadway.

On the use of tubular (low pressure) fluorescent lamps, Dr. Halbertsma said that except in the Nordic countries there was a preference for them to be mounted at an angle rather than horizontally. In Germany they were often mounted lengthwise with the road in order to reduce glare, but this sacrificed one of the great advantages of the tubular lamp, *viz.*, the broad band of brightness on the roadway, especially under wet conditions. Attempts had been made in the Netherlands to utilise this effect on a large scale by suspending a continuous line of lamps across the road at fairly long intervals so as to make the whole of the road surface bright.

A disadvantage of the tubular lamp, said Dr. Halbertsma, was the comparatively low luminous output obtainable from a single lamp; fittings of the "mushroom" type sometimes housed as many as 32 lamps. Another disadvantage was the discomfort glare produced and on the Continent this was regarded as a serious handicap. Some special applications of tubular lamps mentioned were to tunnel lighting and the lighting of bridges. In Belgium experiments had been made with lines of fluorescent lamps built into the parapets of a bridge so that the use of columns could be avoided.

Colour-Corrected Lamps

Turning to the colour-corrected mercury lamps, Dr. Halbertsma said that a considerable number of installations using these lamps had been put into service in different Continental countries. He mentioned in particular the motor road from Paris to the west, the Autoroute de l'Ouest (described in *Light and Lighting* for January, 1955). The use of the lamp on this scale, he said, proved that it had passed the experimental stage, although further improvements might still be made. At present, when new installations were planned on the Continent, the advantages and disadvantages of both types of fluorescent lamps were carefully considered. With increasing values of illumination the balance was likely to swing over to the side of the colour-corrected mercury lamp, at any rate as far as the main thoroughfares and squares in towns were concerned.

Dr. Halbertsma gave a summarised version of his paper and illustrated the various points with a series of well-chosen slides of representative or outstanding installations.

The discussion was opened by Mr. E. H. Jesty, who said that the popularity of sodium lighting in this country was rapidly increasing. He mentioned the very high mounting sometimes used on the Continent and asked whether the reason for this was technical or to avoid wanton damage.

Street Lighting in France and Elsewhere

M. L. Gaymard of Paris showed a series of very pleasing colour slides of installations in France and N. Italy. He said that very high mounting was used principally where there were special reasons for it, as at the bridge of St. Cloud (see *Light and Lighting* for September last), but the maintenance was very expensive.

Mr. B. C. Ossitt showed some photographs of streets in Moscow where, he said, the lighting seemed to be entirely by tungsten lamps.

M. A. Boereboom expressed the hope that members of the A.P.L.E. would come to Brussels to see the special lighting to be installed for the International Exposition of 1958 and the C.I.E. Session in 1959.

Mr. C. Harper referred to the effect of rain on the reflection characteristics of road surfaces and said that this was a matter quite outside the control of the municipal engineer. Mr. J. M. Waldram, however, pointed out that the effect on a rough surface was much less than that on a smooth one. He said that, while in different countries the methods used for lighting the streets seemed to differ considerably, in fact the underlying principles were the same. Any departure from these principles meant the use of more lumens to obtain a satisfactory effect. He instanced the use of wall-mounted fluorescent fittings and said that such a system had to be planned on a very generous scale with close spacing.

Other speakers referred to the use of high mountings and the consequent cost of maintenance, and Mr. L. R. Osgood asked whether lowering gear could be used in such cases. In his reply Dr. Halbertsma said that this was not a very satisfactory solution if the position of the fitting when in service was at all critical. In reply to several speakers he said that the use of lines of tubular lamps across the roadway had not been carried any further because it had proved expensive and motorists had found it uncomfortable when driving along a road so lighted for a considerable distance.

A cordial vote of thanks to Dr. Halbertsma and the other speakers from overseas was proposed by Mr. N. Boydell and carried by acclamation.

A business meeting, closing the Conference, was held shortly after the conclusion of the technical session and it was announced that the venue for 1957 would be Torquay.

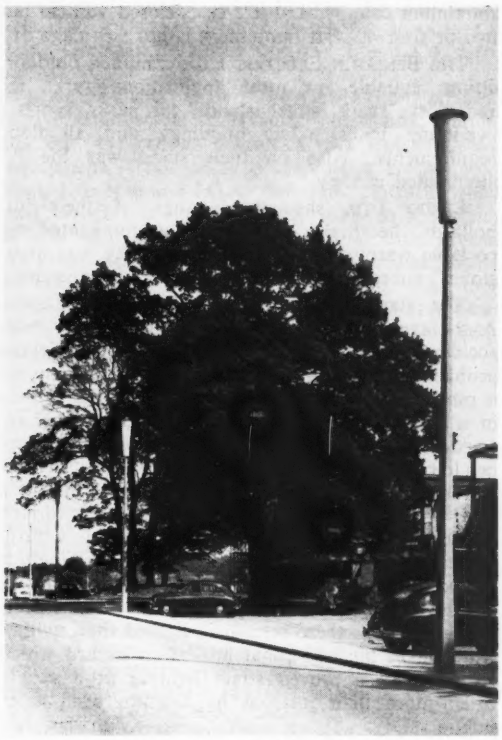
Display of Street Lighting Equipment

The A.E.I. LAMP AND LIGHTING CO. LTD showed new lanterns and columns. New concrete columns, complementary in design were the "Consul" for Group A roads and the "Consort" for Group B roads. Both are available with a variety of galvanised steel or concrete bracket arms for every standard type of street lighting lantern, including fluorescent. This will enable matched columns to be used over large areas for both Group A and B roads to create a uniform daylight appearance. Both are triangular in section with rounded corners. The base compartment is fitted with a hardwood board, a galvanised pressed steel door and an earthing terminal. There is ample space in the base compartment of the "Consul" column for two sets of control gear.

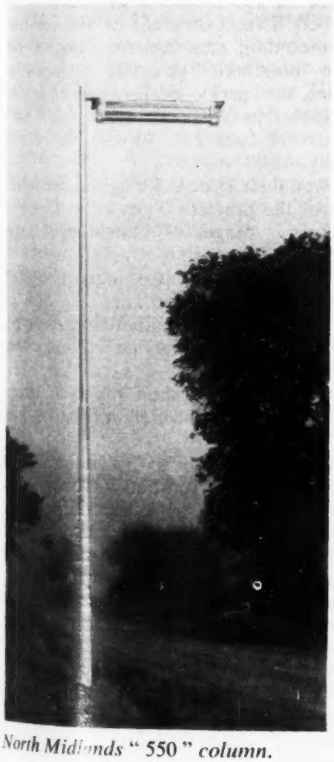
New post-top lanterns for Group B roads were the "Orient" (see page 319), an open tungsten lantern with spun

New A.E.I. columns. Left, "Consul" (Group B) and right, "Consort" (Group A).

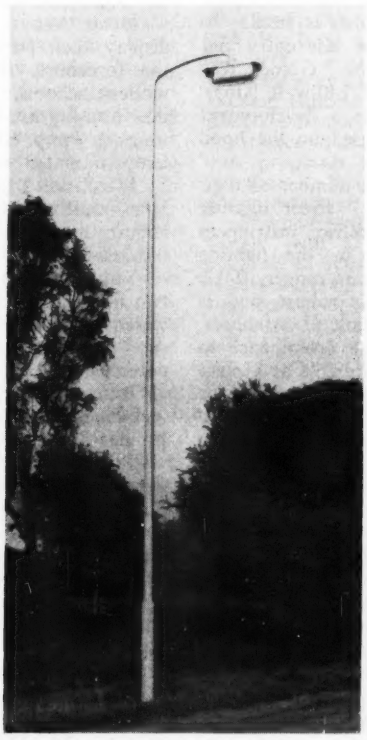
Stanton prestressed spun concrete column with Siemens "Kuwait" lantern.



Stanton concrete columns with A.E.I. post-top lanterns at Crawley.



North Midlands "550" column.



North Midlands "552" column.

Poles Ltd. "Beta/Hendon" column.

aluminium canopy, and a 2-ft. enclosed vertical lantern for two or four 40-watt fluorescent lamps (see page 315).

THE BENJAMIN ELECTRIC LTD. exhibited outdoor lighting fittings suitable for most applications—rural, secondary, and works roads, street islands, car parks, sports grounds, swimming pools, public buildings, and all floodlighting requirements. Also on their stand was the "Teelon" illuminated canopy.

BERGO LTD. showed a range of their illuminated bollards, floodlights for externally illuminated signs and portable warning signs. Also on display was their "Flexi-globe" unbreakable plastic globe for centre island columns.

The stand of the BRITISH ELECTRICAL DEVELOPMENT ASSOCIATION was devoted to statistics on the reduction of accidents brought about by good street lighting. The probability of being involved in a road accident after dark is much greater than during the day; the risk of being killed in a road accident after dark is twice that of a daytime accident, and the chance of being seriously injured is 30 per cent. greater by night than by day. These factors together produce a likelihood of death or serious injury to road-users after dark which is approximately three times the equivalent daytime risk. The entire display, with its charts, diagrams and photographs, illustrated strikingly the part played by modern electric street lighting in reducing the ever-increasing toll of street accidents. It was pointed out that so long as there remain ill-lighted thoroughfares, there will remain the additional hazard—a hazard which can be removed by improved street lighting at a cost which is often more than justified by the improved amenity and public safety.

CONCRETE UTILITIES LTD. took part in the outdoor display, and included a number of their concrete columns on which various "Phosware" lanterns were shown. A new fluted column and a new "Catenary" column were shown for the first time.

ENGINEERING AND LIGHTING EQUIPMENT CO. LTD. introduced new lanterns; the "Blackpool," which is similar to their "Baldock, Mk II" but arranged for side entry and suitable for 80/125-watt mercury lamps; the "Golden Ray Mk V" open type sodium lantern for 45/140-watt lamps, and the "Golden Ray Mk VI," which is a development of the Mk III, with the control gear housed on the hood of the lantern. (See page 313.)

EVAN ELECTROSELENIUM LTD. showed a number of their photometers, including their new "EEL" street lighting photometer, which is a new photoelectric instrument specially developed to meet the needs of the lighting engineer and giving direct readings in four ranges, 0-0.2, 0-1, 0-5, 0-25 lm/ft². The instrument is robust, and is designed to withstand the roughest treatment.

FALK, STADELMANN AND CO. LTD. gave prominence to their new "Beaufort" lantern, which is available as a post-top fitting for 200-watt tungsten lamps or as a bracket for either 200-watt or 100-watt lamps. It is easily converted into six other and more elaborate types; the conversion can be made quite easily after erection if required. The basic unit consists of a spun aluminium hood and a reflector supported by four aluminium alloy tubes secured to a standard spigot cap. (See page 320.)

A. C. FORD LTD. displayed a range of lanterns for Group A and B lighting, brackets and control gear boxes. Their lantern range has been extended to include totally enclosed sodium lanterns with control gear. (See page 314.)

All the lanterns exhibited on THE GENERAL ELECTRIC CO. LTD.'s stand were developed during the past 12 months. The exhibit also included a special demonstration of the new "Osram" integral sodium lamp. Amongst the display of fluorescent lanterns for main road, side road and decorative lighting was a new multi-tube fluorescent lantern for main roads which has a hinged top to enable the gear to be examined the right way up. The "Blackpool" lantern, 900 of which are installed along Blackpool's promenade, was also shown; this lantern houses up to eight 2-ft. 40-watt fluorescent lamps. Two new lanterns housing 40-watt 2-ft. lamps were on show. In one the lamps and "Perspex" reflectors are arranged horizontally; in the other, a post-top mounting lantern, the vertical lamps are provided with vertical reflectors. Also exhibited was a vertical mounting lantern using four 5-ft. 80-watt fluorescent lamps which has been designed specially for the Corporation of London. New sodium lanterns for main and side road lighting and two new totally enclosed mercury lanterns were also exhibited. For side road lighting there was the "Dagenham" which contains the injection moulded bowl refractor optical system, and a post-top lantern which gives an improved light distribution of entirely new form for Group B roads and tree-lined roads especially.

In the outside display a selection of G.E.C. "Altus" and "Brevis" prestressed-plus concrete columns in various aggregates and finishes was shown.

GOWSHALL LTD. displayed a complete range of illuminated signs, guardposts, external lighting fittings, posts and columns.

HOLOPHANE LTD. showed a new refractor (22/4257D) for Group A lighting for use with horizontal-burning 250- to 400-watt fluorescent mercury discharge lamps type MBF/U. This refractor has a smooth exterior with moulded high-accuracy internal prisms providing effective control of the light emission. The distribution may be two-way axial, according to the position of lamp in bowl, or inclination of bowl. The peak beam intensity is at 75 deg. Elliptical shape in plan, the bowl has sufficient depth to contain the lamp in a horizontal or inclined position. The design facilitates development of a shallow lantern body of streamlined appearance. Holophane also showed various other lanterns and refractors for Group A and Group B lighting.

HUME ATKINS AND CO. LTD. exhibited, on the outdoor display, their post-top mounting area lanterns designed for the forecourts of new buildings, recreation grounds of modern schools, gardens, car parks, or for side roads on new housing estates. One type is for use with a 200-watt tungsten lamp, the other for four 2-ft. 40-watt fluorescent lamps mounted vertically.

MEGATRON LTD. showed their Type C.5A lightmeter which is an improved version of the previous Type C.5. This is a robust instrument with four ranges of illumination 0-0.1, 0-0.5, 0-2.5 and 0-5.0 lm/ft².

THE NORTH MIDLANDS ENGINEERING CO. LTD. introduced two new 25-ft. tubular columns (No. 550 and 552), both of which are available galvanised, zinc or aluminium sprayed. Also exhibited were their 15-ft. cast iron and tubular steel columns.

PHILIPS ELECTRICAL LTD. showed their range of lamps including sodium, mercury, fluorescent mercury, G.L.S. and tubular fluorescent.

PHOSCO LTD. displayed their lanterns which have been extended to cover all requirements for both Group A and Group B street lighting. The range of sodium lanterns includes enclosed, open and cut-off types; there are mercury lanterns for enclosed horizontal burning, a cut-off type and enclosed and open types for vertical burning lamps. Fluorescent lanterns include enclosed horizontal types, and post-top and bracket types. Open and enclosed tungsten lanterns were also shown.

POLES LTD., included in the outdoor display a number of their "Adastra" 25 ft. columns of circular and hexagonal section. Shown for the first time was the "Beta-Hendon" column, the construction of which is different from other

"Adastra" sectional columns which are of variable style and strength according to the number and diameter of the telescopic sections; the "Beta-Hendon" column sections are welded together giving a height of 15 ft., the length of weld providing a strong and rigid joint. Accommodation for electrical equipment is provided in the base.

REVO ELECTRIC CO., LTD., showed a new wall mounting vertical fluorescent fitting specially designed for the City of Cambridge. The unit accommodates three 5-ft. 80-watt fluorescent lamps, surrounded by a cylinder of opal "Perspex" with decorative cast dome and base. Another new item was the C15002 post top lantern for Group B lighting which consists of a cast base with integral spigot cap and a tapered cylinder of Pin-Spot "Perspex" surmounted by a spun electro-galvanised sheet steel canopy. (See page 321.) Optical control is by means of the Revo dome reflector. The unit is suitable for 100- to 200-watt tungsten and 80- or 125-watt mercury or mercury fluorescent lamps. Other new lanterns included the C14680 fluorescent lantern for Group B roads; the C14673 open "Perspex" fitting for 45- to 60-watt sodium lamps (see page 318), and a new version of the standard C14407 range incorporating a 14-in. diameter reflector. A selection of Revo columns was shown in the outdoor display.

THE STANTON IRONWORKS CO., LTD., display of eight columns comprised four for Group A and four for Group B lighting. The selection included six different brackets and two columns for post top lanterns. On their indoor stand was a series of coloured views of lighting installations using Stanton lighting columns.

STEWARTS AND LLOYDS, LTD., exhibited a selection of their standard steel columns including twelve of their standard designs suitable for use in either Group A or Group B roads. The indoor display included showcases and photographs of lighting column installations and models of lighting columns.

TUBEWRIGHTS, LTD., a subsidiary of Stewarts and Lloyds, Ltd., showed their standard floodlighting tower.

THE THORN ELECTRICAL INDUSTRIES, LTD., stand included a number of new lanterns. In the sodium section the "Alpha One" was again the main feature. A new sodium lantern was the "Beta Three" (see page 318) which accommodates one 60-watt sodium lamp; all gear is enclosed, including fuses, and an opal plastic diffuser hinges down for easy maintenance. A turquoise plastic cover gives the lantern a pleasing appearance. Side or top entry versions are available. A number of fluorescent street lighting fittings were on display, including the "Alpha Two" triple-tube fluorescent fitting and the "Beta Two" twin-tube 2-ft. fitting (see page 316). On show for the first time was the "Alpha Four" (see page 312) a single or twin-tube 4-ft. 40-watt fluorescent fitting which echoes the design of the "Beta Two." Another new lantern was the "Gamma Two" (see page 316) a 2-ft. version of the four-tube 5-ft. 80-watt "Gamma One" post top lantern. These lanterns are specially designed to give a pleasant decorative appearance and all round light distribution for avenues, gardens and important thoroughfares. The "Beta One" open lantern for tungsten filament or mercury lamps was exhibited showing the two versions of the lantern which are now available.

VENNER LTD., showed a selection of switches designed to coved the many time control requirements of public lighting installations. A feature was made of the skilful attention given to the assembly of a type TJSSP Venner time switch in which a demonstrator assembled the complete switch comprising 212 separate parts.

Other exhibitors included BRIGHT, SON AND CO. (CLERKENWELL), LTD., specialists on the repairs of time switches and gas controllers; the HORSTMANN GEAR CO., LTD., time switches and gas controllers; SANGAMO WESTON, LTD., time switches and photo-electric photometers; the AUTOMATIC TELEPHONE AND ELECTRIC CO., LTD., traffic signals; and SIEMENS AND GENERAL ELECTRIC RAILWAY SIGNAL CO., LTD., traffic signals.

Apart from the display of over 100 street lighting columns and attractive arrangement of bollards, guardposts, illuminated signs, etc., the outside exhibition also included some mobile equipment. This included the SIMON ENGINEERING (MIDLANDS), LTD.'s model I.G.40 hydraulic platform which is designed to lift two men and their tools to a working height of over 40 ft. JOHN GIBSON AND SON, LTD,. showed their alloy tower mounted on a motor vehicle chassis, whilst the main exhibit of VAUXHALL MOTORS, LTD., was their "Bedford-Eagle" three-stage tower wagon. SHAFTESBURY LADDERS, LTD., displayed their trailer tower ladder equipment for both Group A and Group B street lighting.

Situations

Vacant

Ekco-Ensign Electric Ltd. have vacancy in their London Office for LIGHTING ENGINEER. He should be well educated and conversant with modern lighting methods. Apply Senior Lighting Engineer, 45, Essex Street, W.C.2.

TECHNICAL ASSISTANT — ELECTRICAL. — Educated to National Certificate level with practical experience in electrical contracting work for Manchester Engineer's Office. Duties will require experience in estimates, preparation of quotations, and layout particulars of lighting and power installation. Applications, which will be treated in complete confidence, should state age, full details of experience and salary required to C.W.S. Ltd., Engineering Department, Hanover Street, Manchester 4, and the envelope should be endorsed "Technical Assistant."

ELECTRICAL.—A vacancy occurs in a Manchester Engineer's Office for an ILLUMINATING ENGINEER. Candidates must have experience in the design of lighting installations for modern emporiums, factories, offices, etc. The duties include preparation of estimates and a knowledge of electrical contracting would be an added advantage. Five-day week. Pension scheme. Letter of application must give full details of age, experience and salary required to Box No. 927.

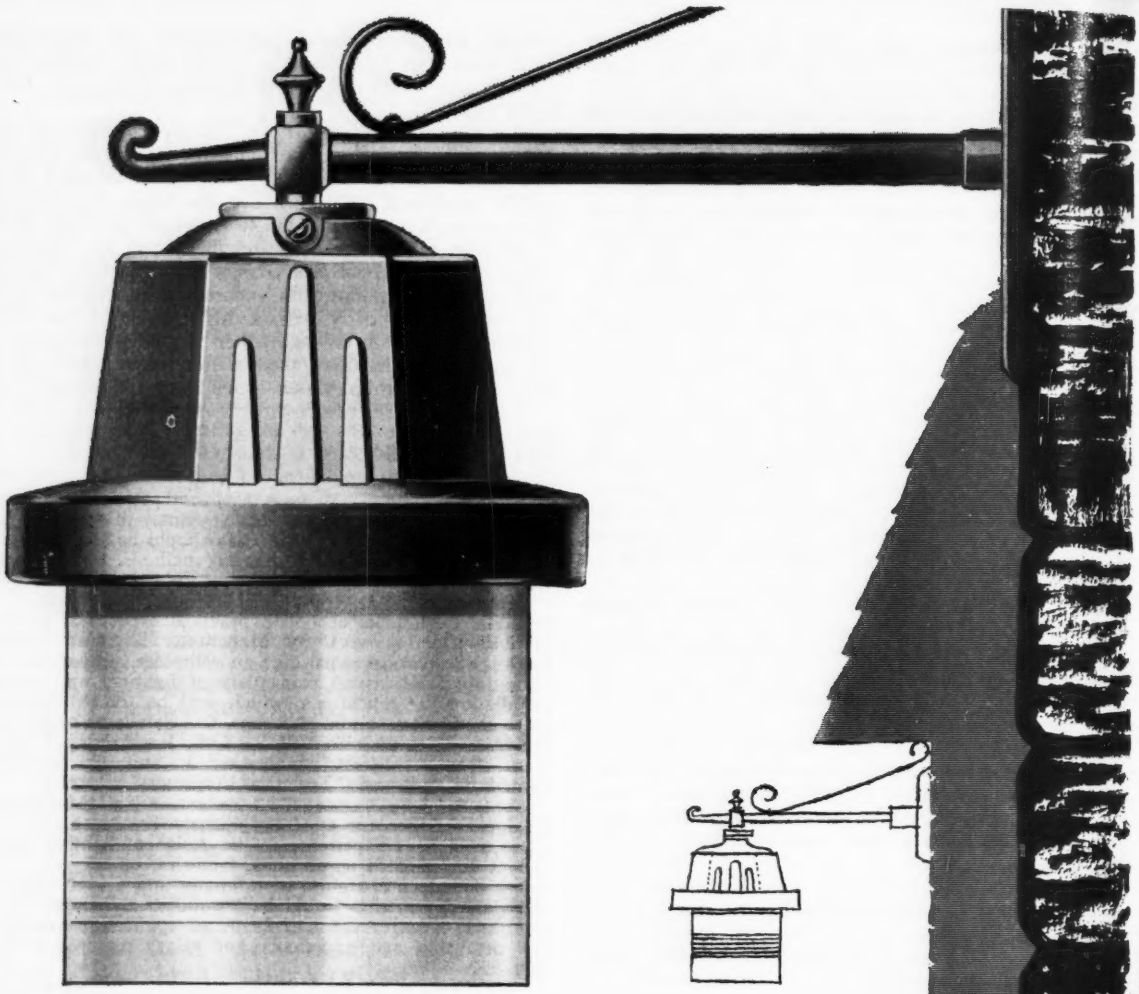
A vacancy exists for a SENIOR LIGHTING ENGINEER in the London Office of Lumenated Ceilings Limited and applications are invited from Registered Lighting Engineers having experience in designing interior installations. Ability to discuss proposals with architects and users at high level is essential. Write in confidence to the London Manager giving details of career and present salary.

Philips Electrical Limited require an ASSISTANT to work closely with a Senior Executive engaged in technical/commercial activities in their Lighting Division. Applicants should be men of initiative, aged 25/32 with an electrical engineering or physics qualification preferably of degree standard. Experience in lamps and lighting desirable. Duties will be varied and responsible, with a starting salary according to qualifications and experience. Bonus and pension scheme. Write, quoting ref. no. 890, to the Employment Officer, Century House, Shaftesbury Avenue, W.C.2.

Miscellany

All sorts of secondhand or reconditioned machinery in the lamp industry is urgently required by Inter-Continental Exports and Imports, 522, Diagonal Road, Visvesvarapuram, Bangalore-4 (S. India).

A new edition of BS 941, Automobile filament lamp (price 7s. 6d.) includes a more comprehensive range of lamps used in present-day motor vehicles, including commercial goods vehicles, and has been extended to include 24-volt lamps. A set of ten schedules giving the main dimensions, cap designation, initial readings and life performance for the complete range of lamps used with 6-, 12- and 24-volt electrical equipment installation has been added, but lamps with British prefocus caps are not included.



It's brighter to include . . .

UNIVERSAL 100 (watts)

Here is a most versatile lantern with a unique optical performance. Solidly built in die cast corrosion resisting aluminium alloy. The 'UNIVERSAL 100' has a cast tubular 'Perspex' refractor with a machine-cut prismatic formation which gives maximum and symetrical light distribution. The prisms are cut on the inside and the refractor has a highly polished exterior.

Low in cost—simple to maintain, and with a high resistance to damage, the 'UNIVERSAL 100' is a most attractive unit for modern lighting schemes.

The high performance—low cost lantern for

MINOR ROADS
ALLEYWAYS
GARAGES
COURTYARDS
DRIVES
DOORWAYS
STAIRWAYS

ELECO

For further information and literature write to :-

ENGINEERING AND LIGHTING EQUIPMENT CO. LTD
Sphere Works, St. Albans, Herts. Telephone: St. Albans 54524/5/6

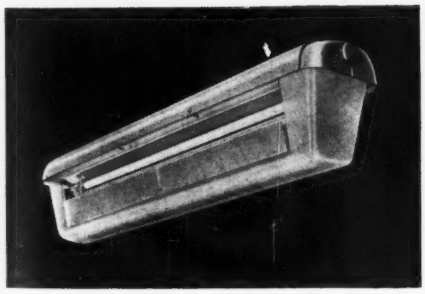
Street Lighting Lanterns

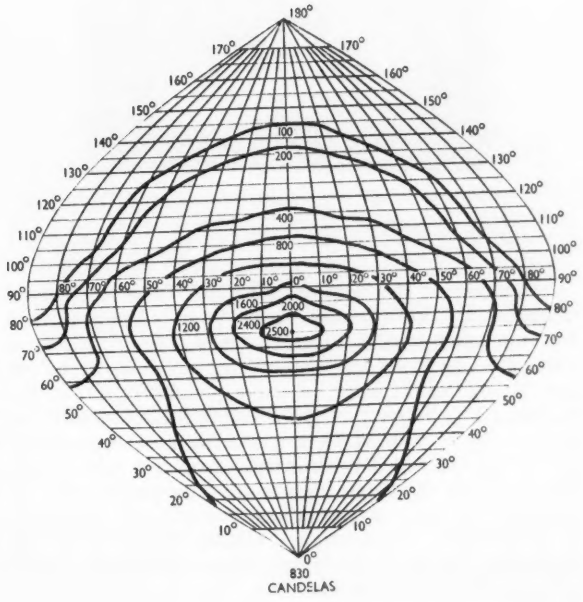
This third annual review includes lanterns introduced during the last year. The information given includes some details not previously published in any form and the review will therefore be a ready source of reference for street lighting engineers and public lighting authorities. It should be noted that though lanterns are classified under those intended for Group A or Group B lighting and are further sub-divided under types of light source used, some lanterns may be used with various types of lamp or for main road or secondary road lighting.

NOTE FOR ARCHITECTS.—**Although the technicalities of street lighting equipment are not the direct concern of the architect, he is called upon to select or design fittings for lighting the precincts of his buildings, including access roads, estate roads, etc., or to advise in their selection or design. Some of the fittings included in this annual survey—in particular the smaller units—are, therefore, worthy of the architect's attention.**

Fluorescent Lamp Lanterns for Group A Lighting

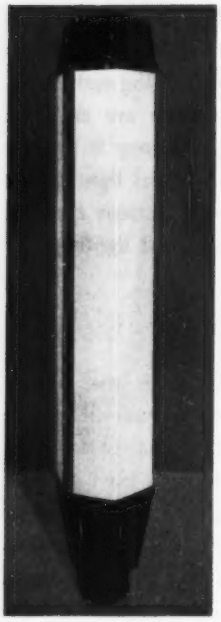
(1) G.E.C. Z.8384 "Three-Eighty"



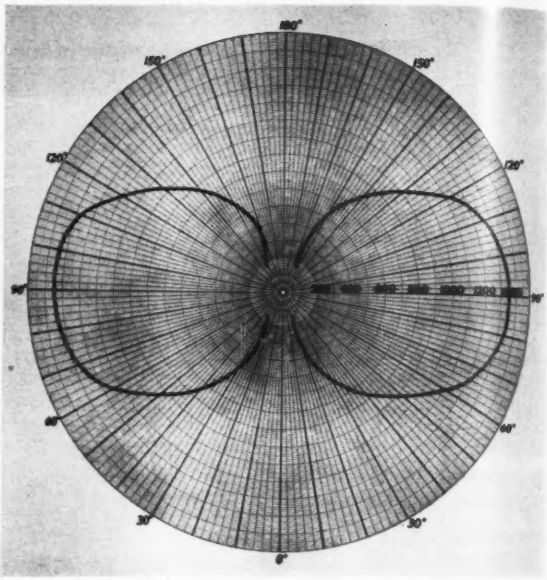


Designed for main road lighting at a mounting height of 25 ft. and a spacing of 120-150 ft. the lantern houses three 80-watt 5-ft. fluorescent lamps. Lanterns can also be supplied for two or four lamps. Featuring modern body design and incorporating concealed hinges and catches which hold one-piece "Perspex" enclosures with sealed-in refractor plates controlling the light, the lantern is arranged for side entry mounting, the bracket being concealed within the body. A hinged top enables the gear to be examined the right way up.

(2) Siemens "Civic"

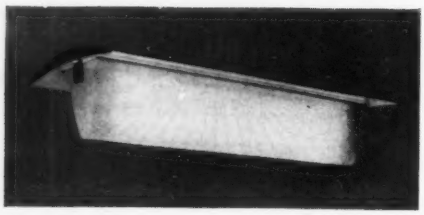


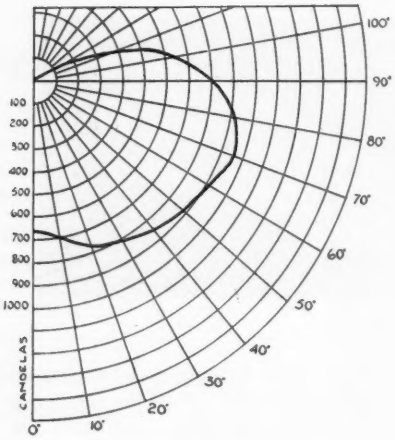
A vertical post-top lantern housing four or five 80-watt fluorescent lamps, giving a symmetrical light distribution. The power-factor condenser is housed in the base, and all other control gear is fitted in trays secured to the spine. One half-section of the hexagonal "Perspex" bowl opens to give access to all lamps. Available for switched or instant start.



With four 80-watt lamps

(3) Thorn "Alpha Four"

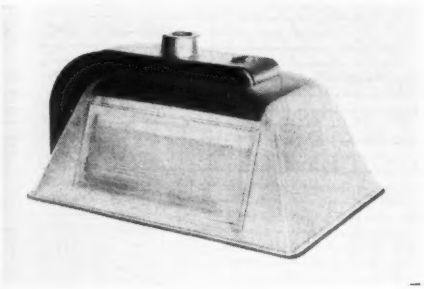




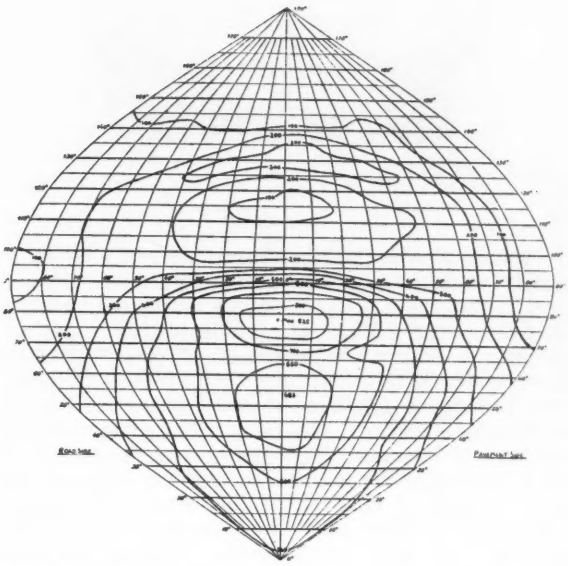
The lantern has a canopy formed from thick sheet aluminium. The diffusing plastic bowl is attached to it by two quick-release toggle catches, one of which is captive. The bowl may thus be hinged down from one end for maintenance, or removed completely should this be necessary. A weather-proof seal between the bowl and the canopy is ensured by a non-water absorbent sponge rubber gasket which has a moulded-on live rubber skin. The joint and the toggle catches are protected by the wide canopy. All control gear is incorporated and the lantern is completely self-contained. Houses four 4-ft. 40-watt fluorescent lamps. Light output below horizontal (average through life), 3,860 lumens.

Sodium Lamp Lanterns for Group A Lighting

(4) E.L.E.Co. "Golden Ray Mark V"

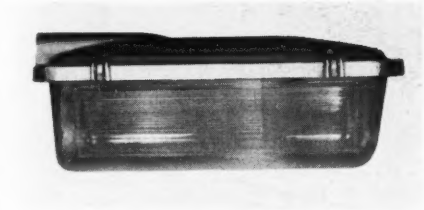


An open type fitting, available in two versions for Group A lighting, with an 85- or 140-watt sodium lamp, and Group B lighting with a 45- or 60-watt sodium lamp. The fitting has a "Perspex" canopy and an aluminium die-cast bracket for top or side entry mounting. Light distribution is obtained by means of a pair of "Perspex" refractor plates and an aluminium anodised over-lamp reflector.

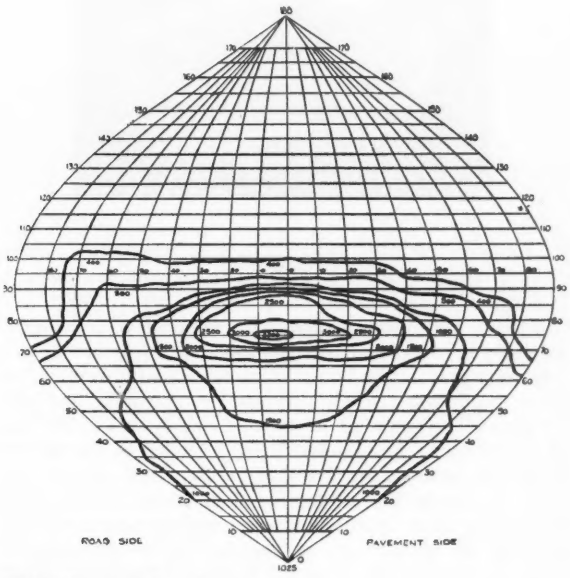


With 60-watt sodium lamp

(5) E.L.E.Co. "Golden Ray Mark VI"

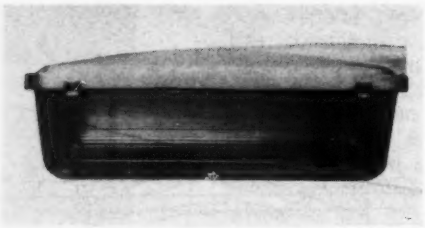


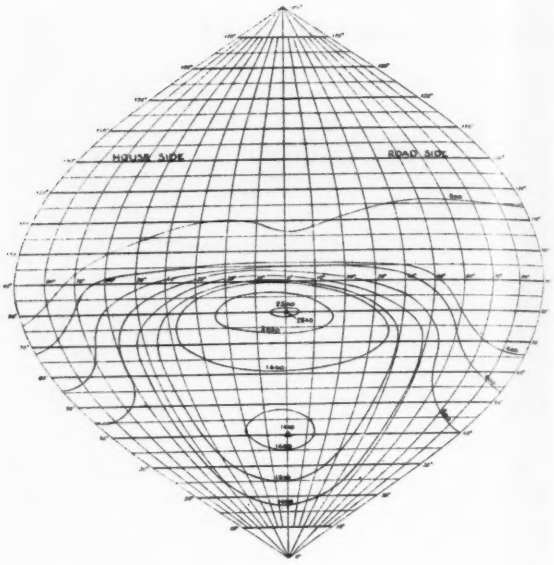
This enclosed type fitting is similar in appearance to the "Golden Ray Mark III." but has been adapted to accommodate the control gear by deepening the enclosing bowl and fitting a specially shaped reflector. The fitting is available for 45-, 60-, 85- or 140-watt sodium lamps, and top or side entry mounting. Accommodation is provided for open protected type or solid filled type leak transformers.



With 140-watt sodium lamp

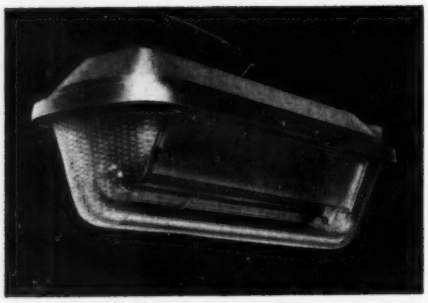
(6) Ford A.C.480

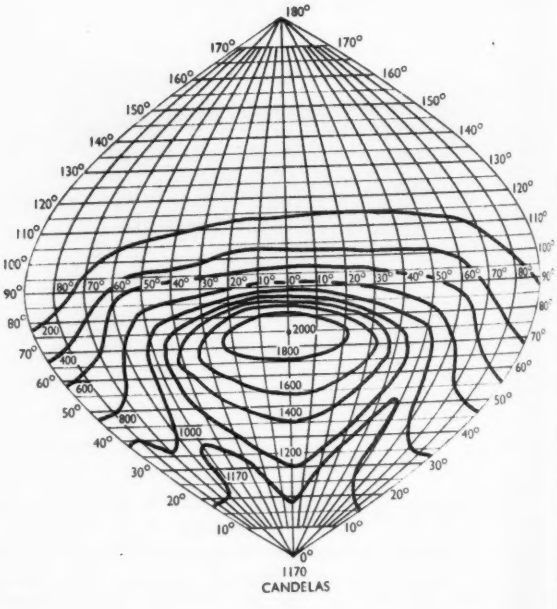




This lantern for 140-watt sodium lamps is a one-piece casting made from silicon aluminium (L.33 corrosion proof) fitted with hinged vitreous enamelled reflector shaped to direct the light through the prisms. Light distribution is achieved by means of " Perspex " refractor plates cemented on the inside of the " Perspex " enclosing bowl thus giving a perfectly smooth interior and exterior to facilitate cleaning. The bowl is hinged to the body and secured by means of quick action toggle catches. A thick resilient gasket is fitted between the bowl and the body to render it dust and weather proof. The lantern will also house the control gear which has been specially designed so that whilst giving efficient electrical characteristics it does not affect the streamlined appearance or optical performance of the fitting.

(7) G.E.C. Z.9452/3 and Z.9462/3



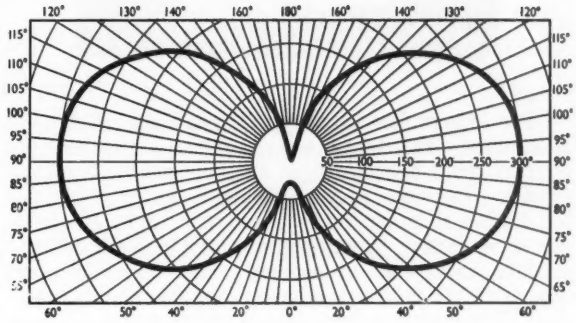


Designed for main road lighting at a mounting height of 25 ft. and a spacing of 120-150 ft. the lanterns house a 140-watt integral sodium lamp. Each lantern body is a one-piece alloy die-casting. In the Z.9462/3 lanterns the body is deepened and arranged to house the lamp operating gear. The lanterns are suitable for side or top entry mounting. Light control is provided by two " Perspex " refractor plates bonded one to each inner side of a " Perspex " bowl. The bowl is hinged to the lantern body and fastened by a spring catch. Both hinges and catch are inside the weathering skirt of the lantern body thus giving it a smooth and neat appearance. All versions of the lantern can be supplied in an aeroscreened form by the use of a special louvred " Perspex " bowl. Smaller versions of these lanterns incorporating similar design features are available for side road lighting using a 45- or 60-watt sodium lamp.

Fluorescent Lamp Lanterns for Group B Lighting

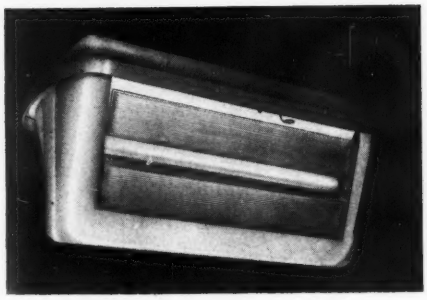
(8) A.E.I. 2-ft. Post-top

A vertical enclosed post-top lantern for use with two or four 2-ft. 40-watt fluorescent lamps. The diffuser is of opal "Perspex" and auxiliary gear is carried within the lantern.

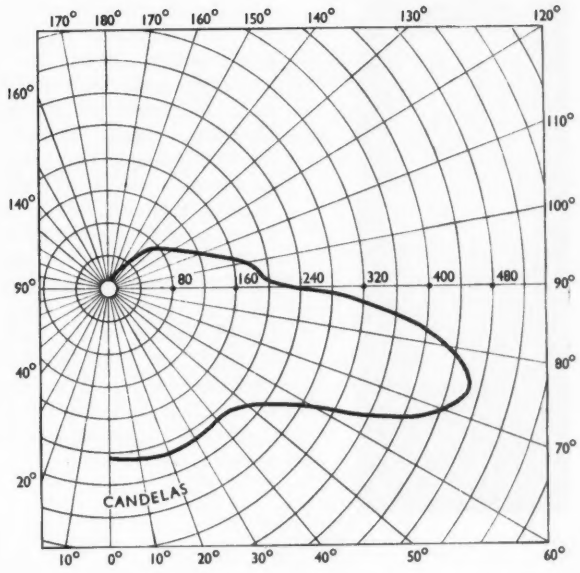


With four 40-watt lamps.

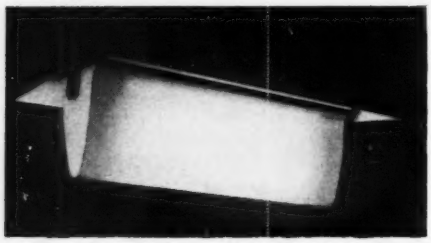
(9) G.E.C. Z.8245/6 "Two-Forty"

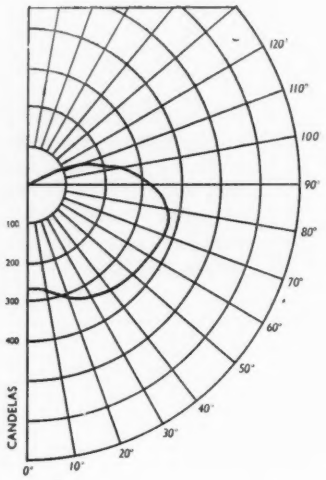


Designed for a mounting height of 15 ft. the lantern houses two 40-watt 2-ft. fluorescent lamps. The body, which can be supplied for side or top entry mounting, is a one-piece light alloy die-casting. All the gear is carried within the body. Light control is provided by four "Perspex" refractor plates two to each inner side of a "Perspex" bowl. The bowl is hinged to the lantern body and fastened by a spring catch. Both hinges and catch are inside the weathering skirt of the lantern body thus giving it a smooth and neat appearance.



(10) Thorn " Beta Two "

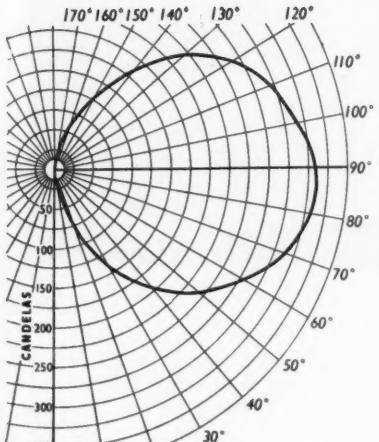




The lantern has a canopy formed from thick sheet aluminium. The diffusing plastic bowl is attached to it by two quick-release toggle catches, one of which is captive. The bowl may be hinged down from one end for maintenance, or easily removed completely should this be necessary. A weatherproof seal between the bowl and the canopy is ensured by a non-water-absorbent sponge rubber gasket which has a moulded-on live rubber skin. The joint and the toggle catches are well protected by the wide canopy. Houses two 2-ft. 40-watt fluorescent lamps. Light output below horizontal (average through life) 1,520 lumens.

(11) Thorn " Gamma Two "

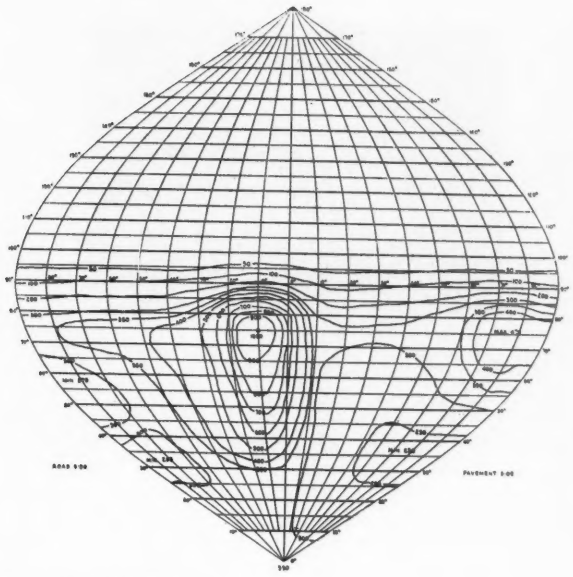
A post-top lantern housing four 2-ft. 40-watt lamps. The plastic diffuser and cap are manufactured as one piece which stands on a small ring gasket at its lower end. By means of a large clamping screw which passes through a gland attached to the cap the diffuser is tightened down on to the gasket, thus achieving an hermetic seal. The diffuser is manufactured from opal acrylic plastic sheet, the cap being of the same material but coloured and cemented to it. The base is a substantial casting of corrosion - resisting aluminium silicon alloy.



Mercury Lamp Lanterns for Group B Lighting

(12) E.L.E. Co. "Blackpool"

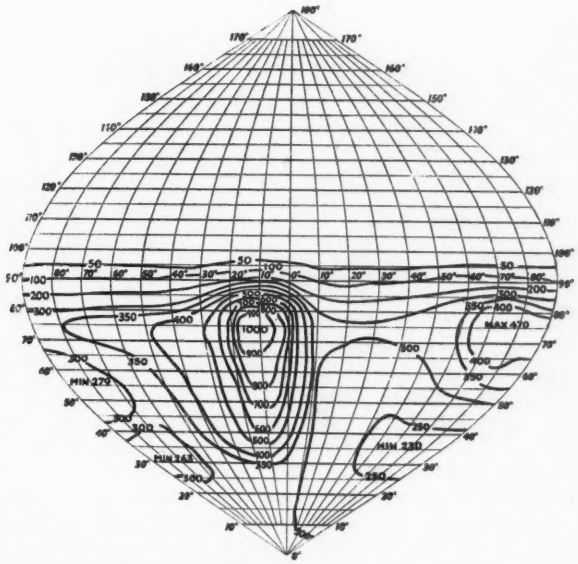
This fitting is a side entry version of the Group B fitting. It has a bowl type glass refractor and is suitable for 100/200-watt tungsten filament and 80/125-watt mercury lamps.



With 80-watt MB/U lamp

(13) Siemens "Firth Bay"

Designed to meet the need for wall-mounting units for pedestrian ways and other situations where the use of columns is undesirable. Available to accommodate 60/200-watt tungsten lamps or 80/125-watt MB/U, MBF/U or MBT/U lamps. The body of the lantern is of cast aluminium alloy, and the refractor bowl is enclosed in a clear "Perspex" globe. Three types of refractors are available to give a two-way axial, a two-way non-axial, or a symmetrical distribution. Control gear is situated in body.

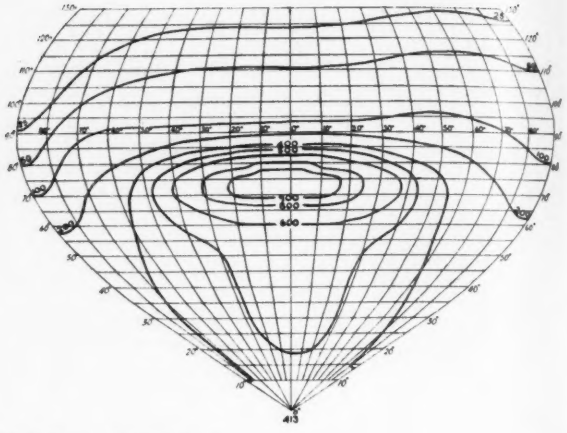


With 80-watt MB/U lamp

Sodium Lamp Lanterns for Group B Lighting

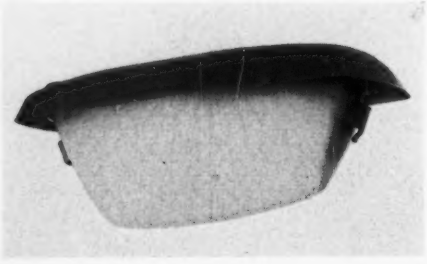
(14) Revo C14673

A one-piece " Perspex " canopy forms the main body of this open type lantern. Two internal " Perspex " refractor panels are securely sealed to the sides, providing smooth surfaces for easy cleaning and preventing the ingress of dust and moisture to the prismatic faces. The internal reflector is of vitreous enamelled sheet steel and has in its centre a removable cover to provide access to the porcelain terminal block for easy wiring. The fitting can be supplied for top or side entry mounting. For use with 45/60-watt sodium lamps.

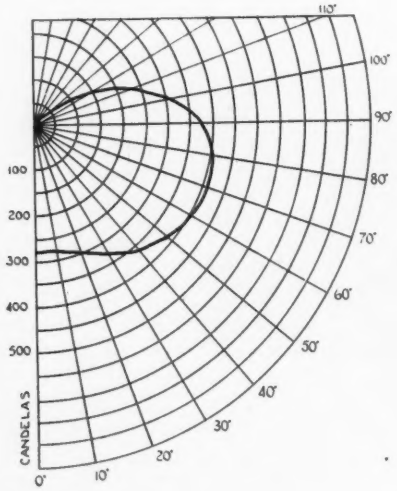


With 60-watt sodium lamp

(15) Thorn " Beta Three "



A pale green plastic canopy is used in this lantern, but the main weight is supported by an internal metal spine which is attached directly to a side entry bracket. Leak transformer, P.F. capacitor, fuses and terminal block are all incorporated so that the lantern is completely self-contained. The diffusing plastic bowl is attached by two quick release toggles (one captive) and weatherproof joint is ensured by a sponge rubber gasket having a moulded-on live rubber skin. The wide canopy gives added protection to this joint and to the metalwork. For use with 45/60-watt sodium lamps.

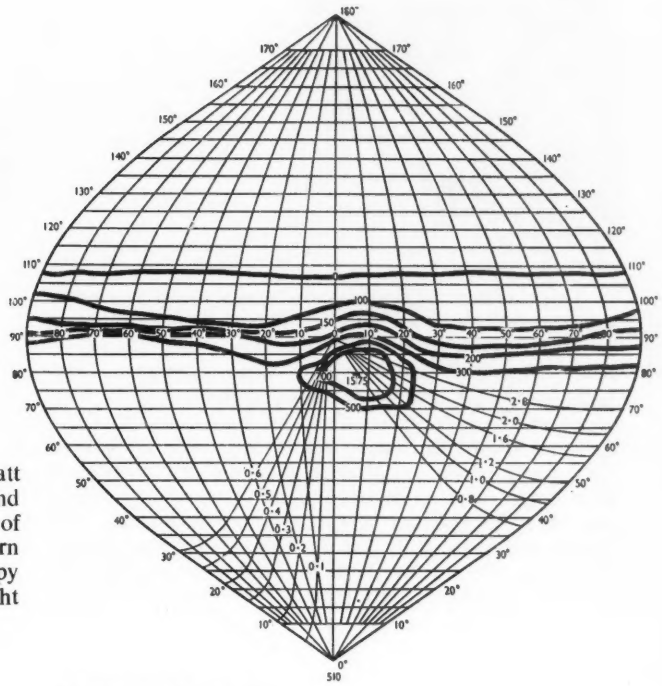


With 60-watt sodium lamp

Tungsten Lamp Lanterns for Group B Lighting

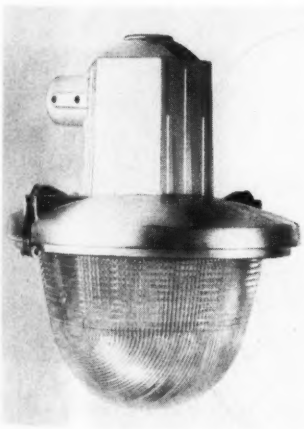
(16) A.E.I. "Orient"

For use with 75/150-watt tungsten or 80/125-watt mercury vapour lamps, it is of contemporary design and is particularly suitable for use in community centres of the new satellite towns and similar locations. The lantern is robustly constructed with a spun aluminium canopy and glass reflector. Available with three forms of light distribution.

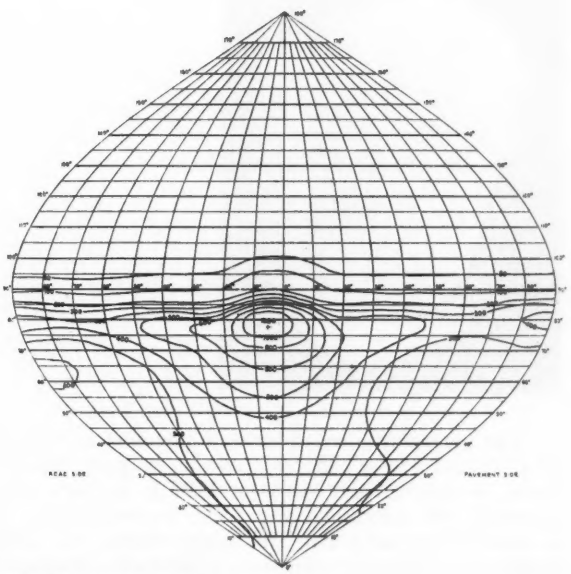


With 200-watt G.L.S. lamp

(17) E.L.E. Co. "Leicester"



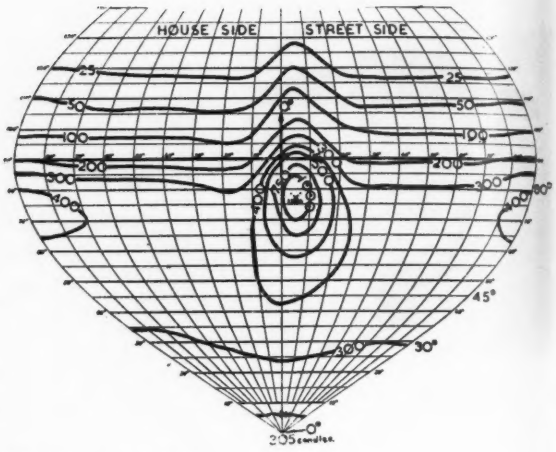
This is a side entry version of the "Letchworth" fitting. It has a glass refractor and is suitable for 100/200-watt tungsten filament or 80/125-watt mercury lamps.



With 200-watt G.L.S. lamp

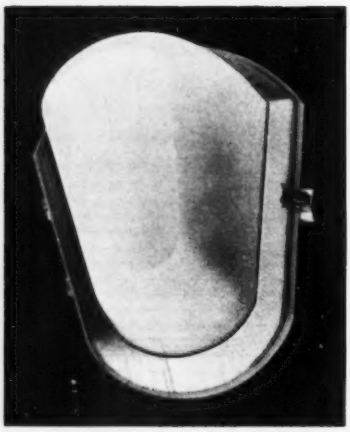
(18) Falk, Stadelmann " Beaufort "

This lantern is available in seven different forms achieved by the addition of " Perspex " enclosures, a dome-type refractor or a glare shield or a combination of clear " Perspex " enclosure and dome refractor. The metal framework consists of a spun aluminium hood, a reflector in two parts, the outer being sheet aluminium and the inner disc of sheet steel, supported by four aluminium alloy tubes which are secured to a die-cast aluminium alloy spigot cap. The hood is stove enamelled smoke grey and the reflector is white stove enamelled. The lantern is for use with 200- or 150-watt tungsten lamps. Two types are also available for wall mounting for 200/150-watt or 100/75-watt lamps.

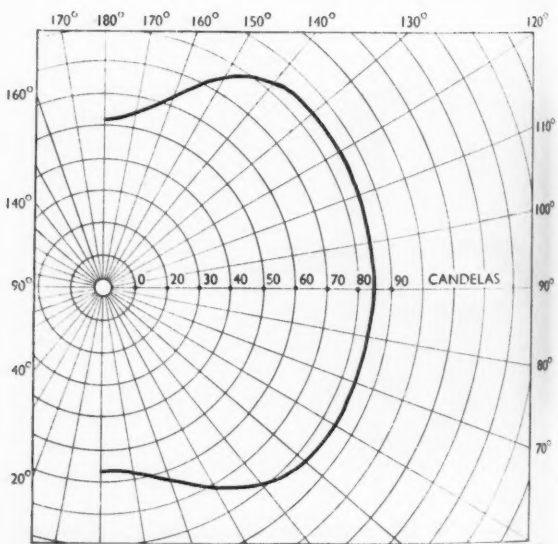


With 200-watt G.L.S. lamp

(19) G.E.C. Z.5720/5 " Limpet "



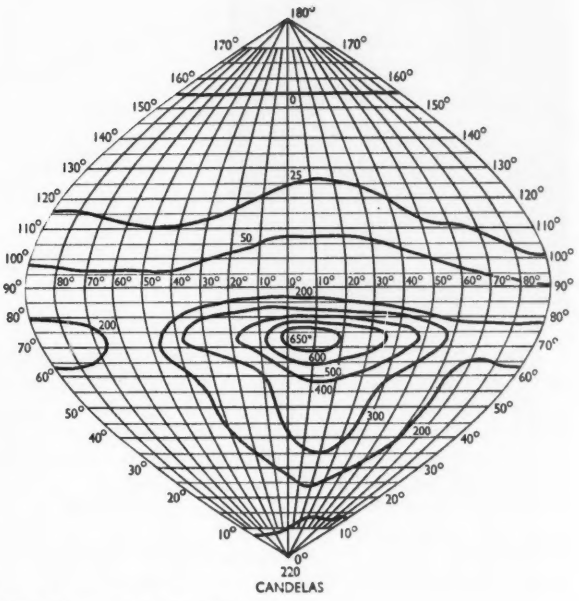
This lantern is intended for wall mounting at a height of 15 ft. and houses either two 60-watt tungsten filament lamps or one 125-watt MB/U or MBF/U mercury lamp complete with operating gear. The lantern consists of a die-cast light alloy flat back which carries the lampholders and lamp operating gear, when used. Hinged to this is a die-cast light alloy rim carrying the opal " Perspex " diffusing bowl. When closed the bowl and rim are secured by a quick release toggle catch.



With two 60-watt G.L.S. Pearl lamps

(20) G.E.C. Z.5580BP "Dagenham"

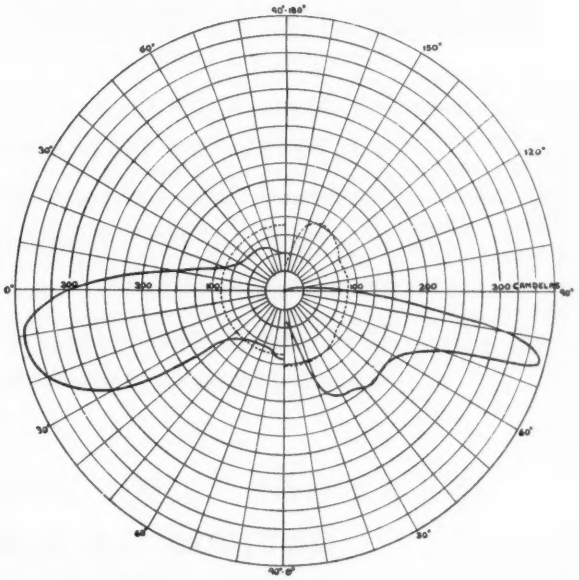
The refractor bowl is a one-piece injection moulding in "Diakon" and has a non-axial asymmetrical distribution suitable for side street lighting. The method of manufacture of the bowl ensures a high degree of repetitional accuracy, more efficient light control because of the high finish obtainable on the prisms, great impact resistance and light weight. The non-axial distribution is obtained by vertical prisms on the outside of the bowl and horizontal prisms on the inside. The body of the lantern is a light alloy die-casting arranged for top entry mounting. Provision is made internally for focusing the various wattages (60/150) of tungsten lamp that can be used.



With 150-watt G.L.S. Pearl lamp

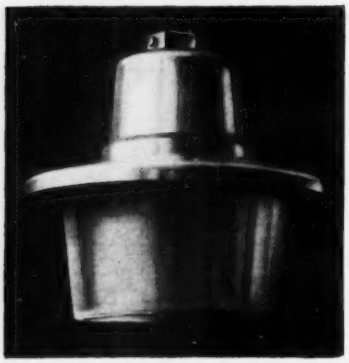
(21) Revo C15002

The lantern, which is of contemporary design, comprises cast base with integral spigot cap and tapered cylinder of pinspot "Perspex" surmounted by an electro-galvanised sheet steel canopy. The canopy is hinged for easy access to the interior of the lantern and is secured by a stainless steel catch. Optical control is by means of the Revo dome refractor and the unit is suitable for 100- to 200-watt tungsten and 80- or 125-watt mercury or mercury fluorescent lamps.

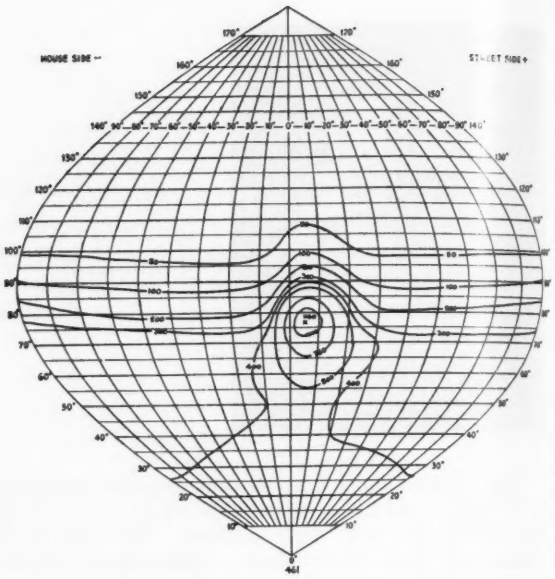


With 100-watt G.L.S. lamp

(22) Wardle "Murray"



This lantern has a single piece top-entry body die-cast in silicon aluminium alloy, stove enamelled aluminium inside and outside. The optical system features the injection-moulded two-piece sealed "Dielikon" which has totally enclosed prisms. Exposed surfaces are smooth for ease of cleaning. The higher efficiency and improved distribution are due to the lower absorption factor of the material, coupled with great accuracy of prism formation. Distribution is 170-deg. two-way non-axial. For 100/150-watt G.L.S. or 80/125-watt MB/U or MBF/U lamps.



With 200-watt G.L.S. lamp

Names and addresses of firms whose lanterns are described on pp. 311—322.

A.E.I. Lamp and Lighting Co., Ltd., Crown House, Aldwych, London, W.C.2.

Engineering and Lighting Equipment Co., Ltd., Sphere Works, St. Albans, Herts.

Falk, Stadelmann and Co., Ltd., 91, Farringdon Road, London, E.C.1.

A. C. Ford Ltd., Pear Tree Lane, Dudley, Worcs.

The General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.

Revo Electric Co., Ltd., Tipton, Staffs.

Siemens Brothers Ltd., 38-39, Upper Thames Street, London, E.C.4.

Thorn Electrical Industries Ltd., 233, Shaftesbury Avenue, London, W.C.2.

Wardle Engineering Co., Ltd., Old Trafford, Manchester, 16.

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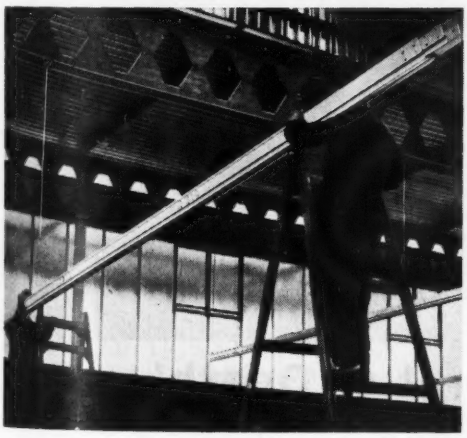

Delivered on site in an advanced stage of assembly this versatile system can be installed with the minimum interference to routine work. Sections are interchangeable and provide simple and quick accessibility for maintenance or dismantling for re-siting. Reflectors can be positioned at any centres along the trunking, and only one Supply Entry is necessary, thus obviating multiple conduit runs. Whole rows may be moved laterally or extra lampways added as required. Wiring for other services may be accommodated in the trunking. Neat and clean in appearance, the high quality finish of Sieline Trunking ensures long life and reliability. For full details ask for leaflet F.22.

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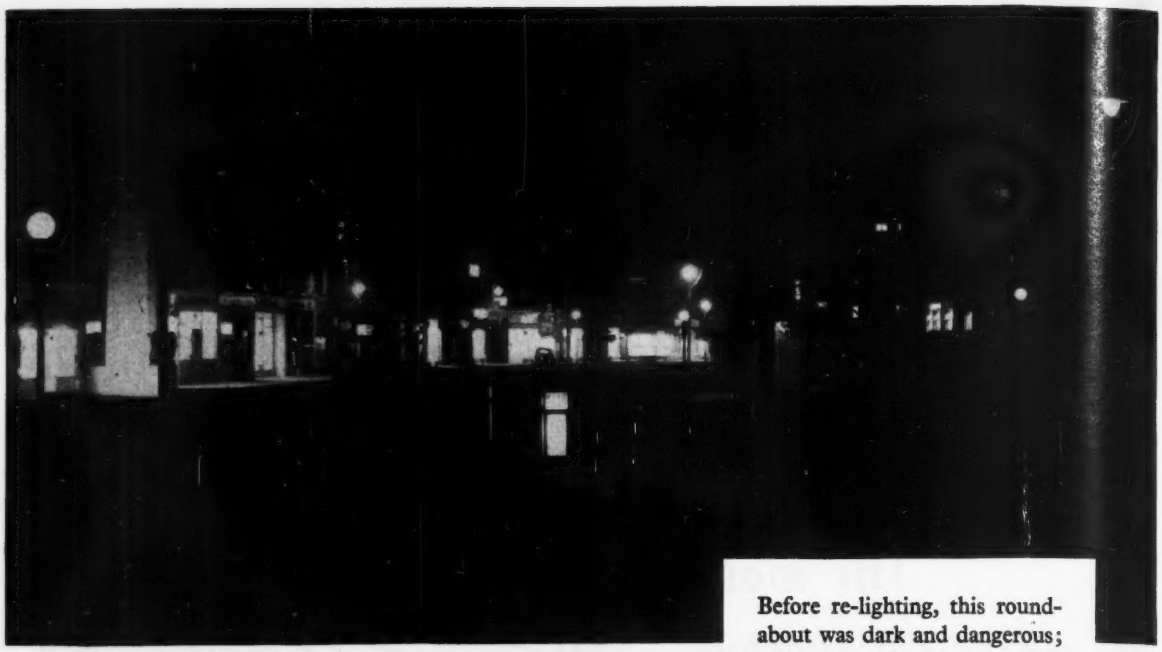


Before re-lighting, this round-about was dark and dangerous; with proper lighting installed it is now clearly visible and very much safer for all road users.

'More Matters of Light or Death'

. . . is the title of a new book issued by the Electrical Development Association, a follow-up to 'A Matter of Light or Death' which is now out of print. Its contents are of the greatest importance to all those who are concerned with road safety.

'More Matters of Light or Death' contains many examples — like the pictures above — of how proper street lighting can reduce the risk of accidents at night, together with up-to-date information on lighting and road safety.

You can get your copy of 'More Matters of Light or Death' from the E.D.A. offices at 2 Savoy Hill, W.C.2, or from your Area Electricity Board.

Issued by the
British Electrical Development Association,
2 Savoy Hill, London, W.C.2

Contrary to the belief of many critics who seem to hold the opinion that the daytime appearance of street lighting equipment is more important than its efficiency in making roads safer at night, the appearance of columns and lanterns by day is given more than casual attention by engineers. In the pages which follow a daylight view of each installation is given—though it should not be assumed that the daytime appearance in every case is considered to be ideal.

Recent Street Lighting Installations

Eastern Avenue, Romford

Eastern Avenue forms part of the London/Great Yarmouth trunk road A.12, and is one of the most heavily trafficked roads on the east side of London.

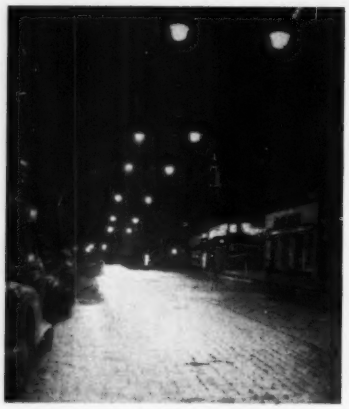
More than half of the 3½ miles of this road within the Borough of Romford was previously completely unlit, the remainder being provided in 1938 with high-pressure mercury-vapour lanterns spaced at rather wide intervals. Now the whole of the length is to be lighted by sodium lanterns. The scheme provides for a total of 321 units, consisting of 140-watt sodium-vapour discharge lamps in Thorn Electrical "Alpha One" enclosed lanterns mounted on spun concrete columns giving a height to light source of 25 ft., with an average spacing of 120 ft. A staggered layout of columns has been adopted with the stagger on the two carriageways in step to avoid the columns being placed back to back on the central reservation.

The scheme was designed by the Borough Engineer Department, Romford, to the approval of the Ministry of Transport. The main contractors are Harland and Wolff Ltd. The total estimated cost of the work, including cabling and service connections which have been carried out by the Eastern Electricity Board, is approximately £25,850. The first section was switched on on August 9.

Birmingham

For the conversion of part of the Birmingham main shopping centre from gas to electric street lighting 139 Revo lanterns have been employed. Of these units, 50 using 1,500-watt tungsten lamps are mounted on existing columns, and 89 1,000-watt units are suspended from span wires. They are spaced at intervals of approximately 70 ft. and mounted at a height of 25 ft.

The fitting comprises a cast aluminium canopy, with vitreous enamelled reflector and heat resisting diffusing outer glass bowl giving a symmetric light distribution. The general design of the lantern was produced by A. G. Sheppard Fidler, City Architect of Birmingham, in conjunction with Sir Herbert J. Manzoni, C.B.E., City Engineer and Surveyor.



Kingswood, Bristol

A new lighting system costing approximately £9,600 has now been installed in Kingswood, near Bristol. The new system is planned to provide an efficient overall lighting system for 3½ miles of road, including streets which carry heavy pedestrian and vehicular traffic, including a section of the main Bristol-London road.

The new installation uses 43 G.E.C. "Three-Eighty" lanterns, each using three 80-watt warm white fluorescent lamps, 29 G.E.C. "Two-Eighty" lanterns each housing two 80-watt warm white fluorescent lamps, most being mounted at a height of 25 ft. on concrete columns, whilst others are mounted on specially designed brackets for securing to existing poles carrying overhead mains. The installation is completed by 50 G.E.C. "Two-Forty" fluorescent refractor lanterns.

Totnes

A sodium streetlighting installation covering over three miles of Class 1 road and consisting of 129 Mazda "Amber" lanterns has recently been completed in Totnes, South Devon. The necessity for a lighting installation which did not detract from the ancient charm of the town prompted the Borough Council to seek the advice of the Royal Fine Art Commission on the types of equipment to be used.

In the centre of the town, where more than half the buildings are scheduled as buildings of architectural interest, the lanterns have been wall-mounted on simple brackets where the streets are narrow. The brackets are individually painted to match the surroundings, ensuring an unobtrusive daylight appearance which is aided by the fact that the lanterns do not appear on the skyline.

On the outskirts of the town Mazda "Trifoil" concrete columns are used.

Leeds

The new streetlighting installation recently completed at Leeds City Square is planned as part of the Leeds City Council's improvement scheme in the town centre. Siemens' "Kuwait" and "Coventry" lanterns have been adopted throughout—the latter for centre island locations.

Typical 'Ford' Conversion Unit

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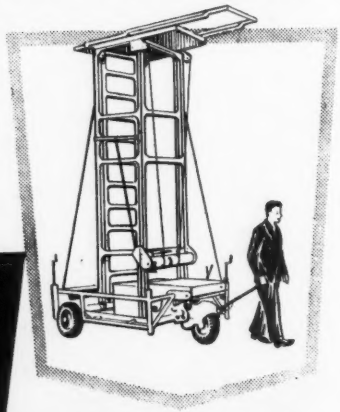
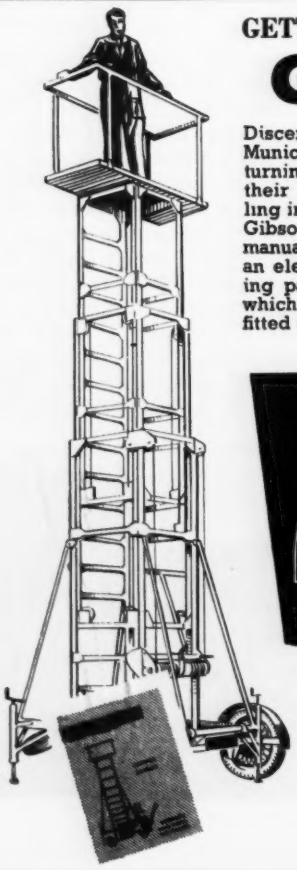


special vehicle designs can be supplied to give seating accommodation for repair gangs or workshops with bench fittings. But why not write for descriptive leaflets and get the whole story?



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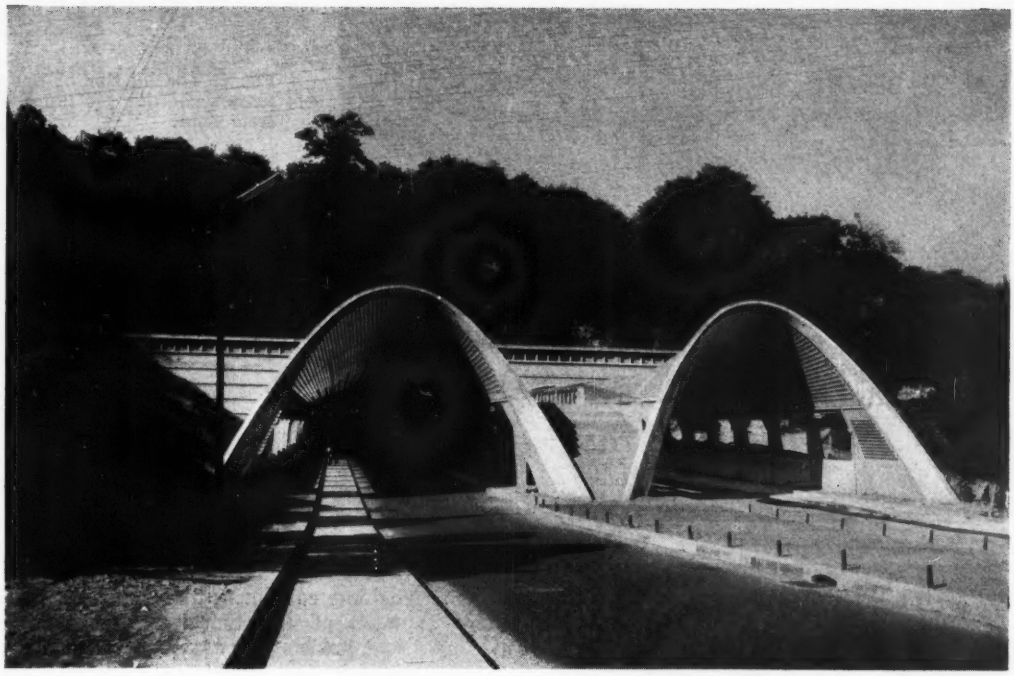


Fig. 1. The northern entrance and exit of the tunnels.

The Le Havre Tunnels

New twin road tunnels connecting the residential area of Caux on the north of the town with the industrial and port areas of Le Havre were put into service in June. Each tunnel takes one-way traffic and has four traffic lanes, one for pedestrians, one for cyclists and two for motor vehicles. Each tunnel is 590 metres long (excluding the entrances and exits) and are perfectly straight with a constant gradient of approximately 1 in 26.

Special attention has been given to the surface of the tunnel lining as this plays a most important part in the lighting of the tunnel. The lining is of reinforced concrete slabs supported by prefabricated reinforced concrete frames. The surface of the slabs is treated by the "Sanilap" process in which the aggregate, mixed with calcium aluminate, is poured cold on to a polished steel sheet, producing a semi-matt surface with good light reflecting properties. (In calculating the lighting for the tunnels the coefficient of reflection was taken as 0.5.) The surface obtained is also easy to clean. The slabs measure 2 m. × 0.26 m. and between each slab there is a gap for sound absorption.

The lighting arrangements are similar to those in the Croix Rousse tunnel at Lyon. In each tunnel two rows of angle-iron suspended from the ceiling carry the power cables; flourescent lamps are fixed to the under side of the angle-iron.

Three lighting systems are provided, for night, cloudy weather and bright sunshine. The change from the night to cloudy weather system is made by hand; the change from cloudy weather to bright sunshine is carried out automatically by photo-electric cells. The lighting was designed to give a minimum of 1.5 lm/ft² by night, and by day the levels given in the table.

Daylight illumination levels (lm/ft²)

		Cloudy	Bright sunshine
Entrance	from 0-15 m.	9	30
	15-30 m.	6	15
	30-50 m.	4.5	6
	Central zone	3	3
Exit	from 50-25 m.	4.5	6
	25- 0 m.	7.5	15

It was found that after 100 hours these values were exceeded by about 50 per cent., thus allowing for depreciation and dust deposits. The level of illumination over the motor traffic lanes is rather higher than that over the pedestrian and cycle lanes.

Attention has been given to the protection of the

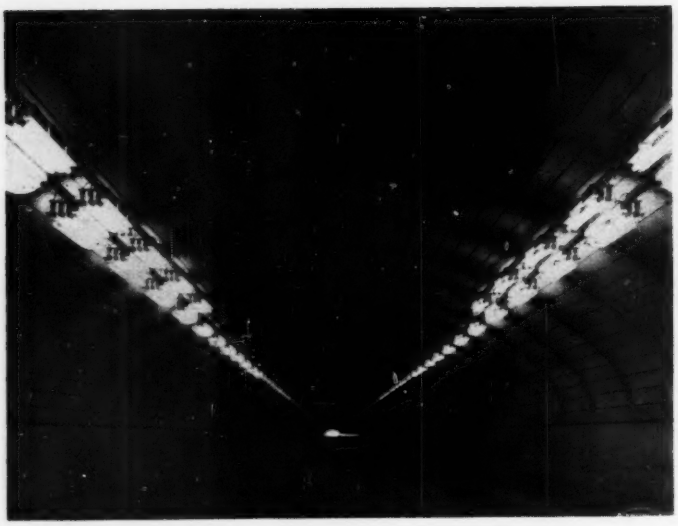
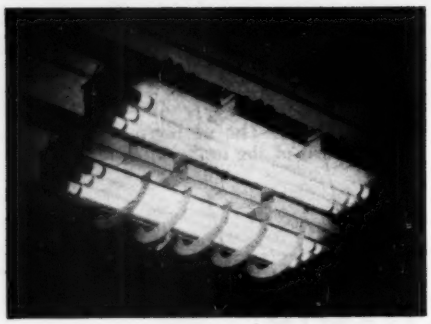


Fig. 2. The interior of one of the tunnels showing the lining of concrete slabs.



Figs. 3 and 4. The number of lamps per fitting is reduced from the entrances towards the centre part of each tunnel and increases again at the exits. The top picture shows a pair of three-lamp fittings used near the entrances and exits; the lower picture shows a single-lamp fitting used in the centre part of each tunnel.

lighting equipment from moisture, particularly when the walls of the tunnel are being washed. Watertight lampholders are used and all auxiliary gear is packed in watertight blocks in watertight galvanised steel boxes. Being near the coast it was also particularly necessary to protect against corrosion; the angle-irons were hot galvanised and given two coats of paint and all other steel parts hot galvanised and stove enamelled. Contact springs are of glucinium bronze, lamp rings are of aluminised aluminium and all screws, bolts, etc., are cadmium coated. To protect the lamps from cold and draughts each lamp is fitted with a sleeve of Pyrex glass; taking the average air temperature within the tunnel as being 10 deg. C., protecting the lamps in this way increases their light output by 10 per cent. The lamps are Claude, Paz et Silva DMS 40 the supply voltage is 220. The lamps are fed from two transformer stations, one at each end of the tunnel, the lamps being distributed alternately to either station as a precaution

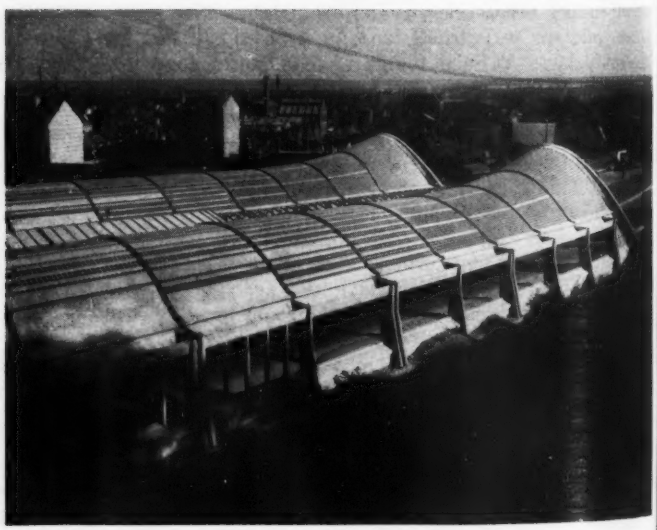


Fig. 5. The exterior of one of the two pairs of entrance and exit arches.

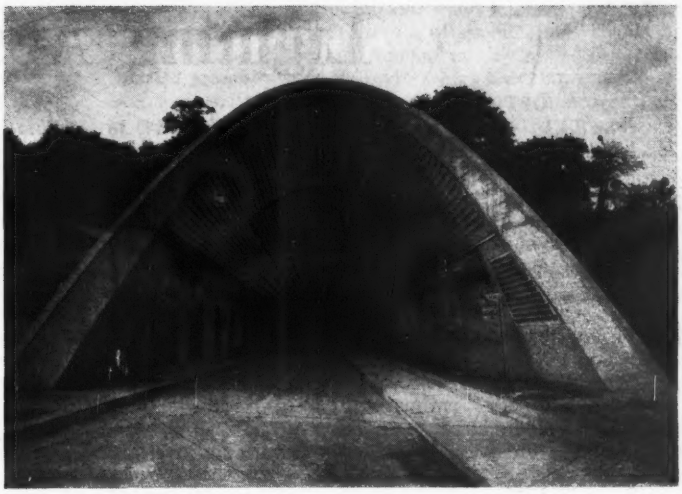


Fig. 6. One of the arched entrances showing how the proportion of glass brick to concrete is reduced as one enters the tunnel.

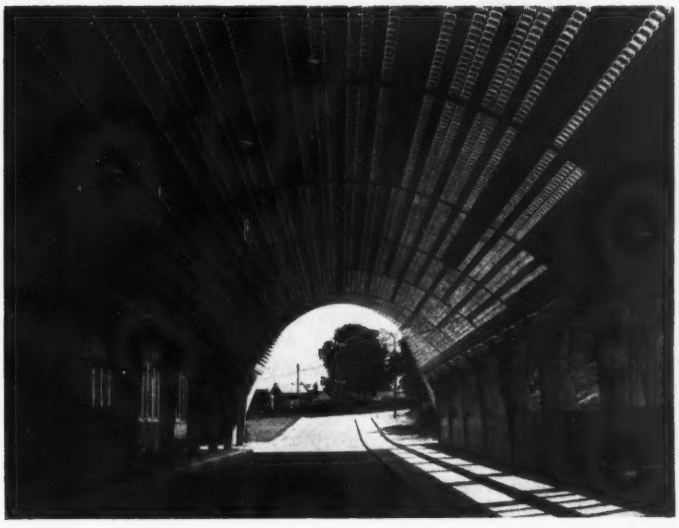


Fig. 7. A view of an exit arch on leaving the tunnel showing the progressive increase in the area of glass in the roof.

against breakdown. In the event of breakdown of both transformers emergency 40-watt tungsten lamps, spaced every 25 metres, automatically come into use.

Of particular interest is the treatment of the entrance and exit to each tunnel to assist in the adaptation of drivers' eyes when passing from daylight into the comparatively low illumination of the tunnel. It is estimated that a period of three seconds is required for the eye to adapt itself from bright sunshine to the 30 lm/ft^2 provided just inside the tunnel. As the speed limit in the tunnel is 60 km. per hour, three seconds represent a distance of 50 metres. Accordingly each entrance and exit has been prolonged by a concrete arch 50 metres long into which is set glass blocks, the proportion of glass to concrete reducing as one enters the tunnel and increasing as one leaves at the other end.

Model tests were carried out to find the most suitable shape for the arches and the decreasing proportion of glass block to concrete. These tests showed that at the entrance to the arch there would be an almost immediate drop of about 40 per cent. in the illumination, but after that a more or less linear decrease to the entrance of the tunnel itself. In the installation itself the number of glass blocks is greater than that theoretically required so that adjustments by blanking out blocks can be made to get a gradual and even transition. It was, in fact, found when the tunnels were brought into use that after the initial drop in illumination at the first arch there was a slight increase before the steady decline began and therefore certain glass blocks in the first sections of the arch have been blanked out to give the effect required at the entrances and exits.

Lighting Abstracts

OPTICS AND PHOTOMETRY

613.843.36

354. Review of the cone-to-rod ratio as a specification for lighting systems.

J. L. BROWN, *Illum. Engng.*, **51,** 577-584 (*Aug.*, 1956).

In order to maintain the eyes at maximum sensitivity for seeing at low luminance levels, red goggles are sometimes worn during a preliminary period of dark adaptation and red illuminants are often used for instrument markings, etc., in ships and aircraft. The theory is reviewed of the use of an illuminant for performing visual tasks which depend on the cones while preserving sensitivity for visual tasks which depend on the rods. The cone-to-rod luminous efficiency ratio has been used to determine the relative advantages of illuminants of different spectral composition. Two methods for the calculation of the ratio are described and compared. P. P.

612.843.367

355. Relation of changes in pupil size to visual discomfort.

J. M. FUGATE AND G. A. FRY, *Illum. Engng.*, **51,** 537-548 (*July*, 1956).

Details are given of the apparatus and experimental techniques used to determine the changes in pupil diameter resulting from one-second exposures of the eye to a stimulus producing glare corresponding to the BCD criterion (borderline between comfort and discomfort). The pupil constriction was found to vary from observer to observer and to be dependent on the size of the stimulus. When the muscles of the eye exposed to the glare stimulus were drugged, no change in the BCD criterion was observed. Paralysis of the muscles of the second eye (used to make the pupil diameter measurements on) resulted in all but one observer being unable to obtain the BCD sensation even with the largest and brightest glare stimulus. The threshold of involuntary blinking was also studied. P. P.

535.24 : 535.65

356. Recent developments in photometry and colormetry.

G. T. WINCH, *Trans. Illum. Eng. Soc.* (*London*), **21,** 91-107 (*No.* 5, 1956).

New tungsten filament secondary standard lamps are described and also tubular fluorescent secondary standards which, when used in an international photometric and colorimetric interchange, showed good agreement on measurements. Possible improved future changes in the CIE data and the effect these may have on photometric and colorimetric values are indicated. New developments in physical photometry and colorimetry are described, including preliminary experience with photon counting techniques as a means of increasing sensitivity. Improved photometric integrator paint is described, as this is now necessary in order to meet the new accuracy requirements. Brief reference is made to colour-rendering properties of light sources in connection with attempts to relate this subjective effect with objective measurements. The future possibility of applying ultrasonic modulation to colour measurements is indicated. W. R.

LAMPS AND FITTINGS

621.326

357. Some methods for the improvement of the strength of miniature filament lamps.

J. MARTIN, *Illum. Engng.*, **51,** 504-509 (*July*, 1956).

Recent increases in the supply voltages of car and aircraft electrical systems have resulted in the production of lamps with filaments of smaller diameter and greater lengths. These filaments are weaker in their resistance to impact and vibration failure. The mechanism of filament failure is discussed and some ways in which early failures can be overcome are described. Attention to the filament support and to the diameter of the wire results in some improvement. "Doping," or the use of additives such as thoria or silica, alters the crystal structure of the filament and produces increased stability. P. P.

621.32

358. Light sources for colour-matching.

E. E. MILES AND D. C. PEACH, *Trans. Illum. Eng. Soc.* (*London*), **21,** 135-143. (*No.* 6, 1956).

Considers the problems associated with colour matching, and discusses the relative characteristics of daylight and artificial illuminants from this aspect. The matching of colours having a fluorescent component, and of fluorescent whites, is discussed, and artificial light sources for colour matching are compared. A source combining tungsten filament and fluorescent lamps which reproduces the required conditions is proposed. W. R.

621.327.4

359. Effect of operating variables on mercury lamp performance.

E. B. NOEL AND E. C. MARTT, *Illum. Engng.*, **51,** 513-521 (*July*, 1956).

Variations of lamp operating characteristics (*viz.* lumens, lamp current and lamp watts) with changes in supply and lamp voltages have been measured for 400-watt mercury vapour lamps with quartz arc tubes operating vertically and horizontally in lag, lead, series and constant wattage ballast circuits. Lumen output is lower if the lamps are burnt horizontally, but this can be corrected by using ballasts designed to supply the extra watts required. Poor lumen maintenance results, however, with inadequate supply regulation or where the ballast produces a peaked current wave form. P. P.

621.326.7

360. Luminous intensity of a filament lamp after switching on or off.

L. J. H. EXALTO AND B. J. VAN DER WAAL, *Lichttechnik.* **8,** 343-344 (*Aug.*, 1956). *In German.*

The curve showing the rise or fall of luminous intensity of a filament lamp immediately after switching on or off can be calculated from the known properties of tungsten and the ratio of the watts under normal running conditions to the weight of the filament. The authors have made experimental determinations of these curves by means of a recoding photometer and have established a master chart which enables the rise or fall curve to be drawn quite easily for any filament lamp for which the watts/milligram are known. The paper contains a table giving this ratio for lamps of the general lighting service type. J. W. T. W.

LIGHTING

628.9

361. Lighting in buildings—training and practice.

DEREK PHILLIPS, *Trans. Illum. Eng. Soc.* (*London*), **21,** 49-62 (No. 3, 1956).

Examines the training and practice of architects and lighting engineers to try to identify the causes of inadequate mutual co-operation. R.I.B.A. examinations are shown virtually to ignore lighting whilst those of the City and Guilds are insufficiently related to practical and aesthetic aspects of architecture. Suggestions are made for additions to the syllabuses and regarding educational methods which might be employed. The paper analyses existing lighting practice and suggests that limitations can be tackled by better relations between the architect and lighting engineer.

revised educational requirements, the adoption of valid lighting criteria and on improved professional status of the lighting engineer. W. R.

628.9

362. **How to organise a lighting maintenance company.**
M. E. HASKINS, JR., *Electrical Construction and Maintenance*, **55**, 82-85 (Aug., 1956).

Outlines the major considerations involved in commencing a lighting maintenance company under the headings: market potential; manpower requirements; financial requirements; equipment and material; business procedures; field procedures; rates; contracts; selling points. Data is given relating to capital investment, income and expenditure costing and field routine, and practical suggestions are made for improving field operations. W. R.

363. **Lighting design calculations.** 628.93
RONALD CROFT, *Electrical Times*, **130**, 39-43 (*July 12th*, 1956), and **130**, 82-86 (*July 19th*, 1956).

An article in two parts describing a method of calculating interior illumination and luminaires using an extension of the lumen method of lighting design based on the three curve principle of polar curve analysis. The procedure is to classify luminaires by flux ratios, i.e., the percentage of the direct flux component in the 0 to 40 deg. zone, and to derive the coefficient of utilisation in terms of light output ratios and utilisation factors (luminous flux on reference plane/luminaire flux output) derived separately for the direct, indirect and horizontal components of flux output. The method is shown to be applicable to the calculation of interior luminances. Data given includes tables of component light output ratios, flux ratios and utilisation factors, and correction factors for light floors. W. R.

628.972

364. **Researches on the effect of lighting conditions on performance and fatigue.**
H. L. HORNEY AND M. THOMAS, *Lichttechnik*, **8**, 296-300 (*July*, 1956). *In German.*

Bead-threading was carried out by 20 subjects, aged 19 to 51, under different illuminants and at five illumination levels ranging from three to 200 lm/ft². The illumination was from a translucent ceiling and the lamps used were tungsten, colour-corrected mercury, and "white" fluorescent. The beads were of five colours and of such a size that the work could be described as "medium fine." Both performance and fatigue were measured, the latter by determining the maximum sound frequency audible to the subject. With tungsten a maximum performance was obtained at about 100 lm/ft², but with colour-corrected mercury the performance rose continuously. In both cases the fatigue showed an ill-defined minimum between 30 and 100 lm/ft². With fluorescent, the performance curve indicated a maximum and the fatigue a minimum at about 200 lm/ft². J. W. T. W.

365. **Decorative lighting—a designer's approach.** 628.972
D. W. DURRANT, *Trans. Illum. Eng. Soc.* (*London*), **21**, 117-129 (*No.* 6, 1956).

Deals broadly with the aesthetic aspect of lighting and examines the approach of a designer when dealing with a known interior by comparison with the problem of designing stock fittings. The trend of design is reviewed in relation to colour, form, light and shade, contrast and novelty and factors influencing fashion, taste and technique are indicated. A number of installations are appraised in relation to contemporary thought and a plea is made for more good design and "lighting artists" in the industry. W. R.

366. **Lighting for commercial kitchens.** 628.972
Illum. Engng., **51**, 553-557 (*July*, 1956).

Prepared by the Sub-committee on Kitchen Lighting of the American IES, this study analyses the types of visual task met with in restaurant and hotel kitchens and makes recommendations for the levels of illumination, colour of illuminant and design of luminaires. 30 lm/ft² is recommended generally with 50 lm/ft² where checking and inspection are carried out. Tungsten or colour-improved cool or warm-white fluorescent lamps are favoured for optimum colour rendering of foods. P. P.

628.92

367. **Effects of nearby walks and concrete areas on indoor natural lighting.**
B. H. REED, *Illum. Engng.*, **51**, 532-536 (*July*, 1956).

Illumination levels have been measured in a model room when the ground outside the window comprises varying depths of highly reflecting paving (60 per cent.) and when the window is provided with three types of overhang. With paving nearer than 10 feet to the window the diversity of illumination across the room is impaired. The optimum position for paving was found to be between 10 and 40 ft. from the window. P. P.

628.93

368. **Reliability of the calculation methods used for interior lighting design.**
H.-D. ABERGER, *Lichttechnik*, **8**, 258-9, (*June*, 1956). *In German.*

From time to time it has been reported that the various methods used to calculate the illumination in a room from a knowledge of its dimensions, the reflection factor of walls and ceiling, and the type and number of fittings used, sometimes give inaccurate results. The author describes four such methods and applies them to four typical lighting installations. He finds that with two of the methods the calculated values are grossly in error in all cases; a third method gives values which are within about 20 per cent., but the best results are obtained by the use of the Moon and Spencer "interflection" methods and tables. J. W. T. W.

628.93

369. **Direct flux, inter-reflections, and final luminances in rectangular rooms.**
R. O. PHILLIPS, *Trans. Illum., Eng. Soc.* (*London*), **21**, 75-89 (*No.* 4, 1956).

A method is developed from first principles for finding the average illumination on any surface of a rectangular room due to the luminances of the other surfaces. This method depends on the Hisano "room index," k, and an associated function P_k, derived from the work of Yamauti, which is tabulated for a range of values of k. Illustrative examples show how it may be used to determine the direct flux required to produce a pre-determined luminance pattern, or to reverse this procedure. Some comparisons are made between the results obtained by this method and by others, including direct measurement, and the agreement is shown to be generally satisfactory. W. R.

628.92

370. **Manufactured light vs. daylight for schoolrooms.**
R. F. HAMMEL AND L. E. JOHNSON, *Illum. Engng.*, **51**, 493-502 (*July*, 1956).

Four types of school window design are analysed in terms of overall cost of building, heating, lighting and lamps. A type having only a 4 ft. high vision-strip window in the shorter wall, and relying on artificial means for providing an adequate quantity of light, was found to have a somewhat smaller annual cost. Good comfort conditions, more uniform lighting and a greater ability to adapt to audio-visual teaching techniques are also claimed for this type. Two suggested school layouts are offered resulting in more compact buildings. The proposal that artificial light should be used throughout the day for interior seeing purposes is not confined to schools but is extended to offices, factories, hospitals and churches. P. P.

Correspondence

Fluorescent Lighting

Dear Sir,—Your contributor "Lumeritas" has several times in recent months waxed humorous concerning my attitude to the dangers of fluorescent lighting and high intensities of artificial lighting in general.

I have a sense of humour, and many of the remarks made by "Lumeritas" have been amusing enough in themselves, but the matter is really very serious, and it seems rather a pity to treat it with much levity.

"Lumeritas," and indeed every intelligent person, must know that all artificial light is harmful to the eye and should be used with discretion and restraint, and every observant person must be well aware of the fact that the general standard of eyesight has deteriorated badly in the last 20 years.

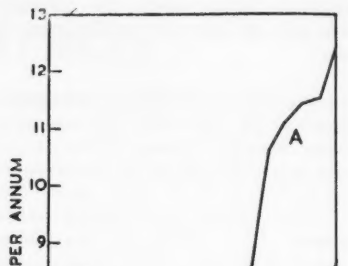
What is still more alarming is the increasing number of blind persons in recent years. In view of this dreadful fact it surely behoves us to do everything in our power to prevent any further increase in this scourge, by avoiding all possible causes of eyestrain.

London. G. V. DOWNER.

Dear Sir,—In spite of what I wrote in my September "Postscript," Mr. Downer still says I must know the "facts" stated in the third paragraph of his letter. Let me assure him, without levity, that I do not know them. On account of this ignorance, Mr. Downer may no longer include me in the class "intelligent and observant persons," but I shall bear my expulsion with equanimity.

It is difficult to understand why Mr. Downer is in the artificial lighting business, knowing, as he persistently says he does, that *all* artificial light is harmful to the eye, since "all" embraces even that which is used with what he is pleased to regard as "discretion and restraint." Would he not sleep sounder o' nights if engaged in selling window-glass, venetian blinds or some other daylighting appurtenance rather than anything for even the restrained use of noxious artificial light? Can it be that, faced with man's ineradicable propensity to make use of a sight-damaging agent, Mr. Downer, with admirable altruism, has forced himself to purvey this agent so as to have some opportunity to ration it? If I do not share Mr. Downer's belief in the intrinsic noxiousness of artificial light it is not because I, too, am in the lighting business; I am not—yet. However, invitations to join the boards of prosperous companies thus engaged, but not addicted to decrying artificial light, would confront me with no weighty problems of conscience!

But, Mr. Editor, the main reason for my intrusion into your correspondence columns is to dispute what is insinuated by Mr. Downer's reference to the blind. It is true that, in recent years, there has been a serious increase in the actual number of persons newly registered as blind, but there is nothing to support the implication that this "dreadful fact" is at all related to conditions of lighting —Downerian or otherwise. The increase is "largely, if not entirely, explained by the natural increase in the population and by a shift in ages of the general population" (*vide* The Causes of Blindness in England, 1951-1954, Min. of Health, London, H.M.S.O., price 3s.). I have prepared the accompanying graph from the figures given in the publication quoted; it covers 18 of the last 20 years. A glance at this shows that (a) the recent increase in the number of blind persons is only among persons who have completed or exceeded the Biblical span of life (see curve B), and who, on this account, are most unlikely to have had any recent regular exposure to either fluorescent lighting or to high intensities of artificial lighting and are even less likely to have encountered these "dangers" during any but the closing years of their occupational life; (b) the number of blind persons of all other ages (curve C), who are clearly more likely to have had a longer exposure to "risk," shows no increase in recent years as compared with pre-war years.



A—Blind persons of all known ages.
B—Blind persons aged 70 and over.
C—Blind persons under 70 years old.

Some increase might, indeed, have been expected simply because the number of people has increased. If the absence of this expected increase has anything at all to do with modern artificial lighting—and I do not believe it has—it can only belie the "dangers" that Mr. Downer so assiduously hypothecates.

Yours, etc.,
"LUMERITAS."

Lighting Terms

Dear Sir,—How refreshing it is to find an article such as that by Dr. Walsh on "Modern English Usage for the Lighting Engineer" in your September issue! How disappointing, though, to find in the same issue the word "Brightness" used in a paper (pages 243-248) when according to modern thought the term "Luminance" would be more correct!

Likewise in the Transaction of the I.E.S., Vol. 21, No. 8, 1956, page 199, the word "nit" occurs, even though this paper was written nearly a year after the nit was with great rejoicing shot dead at the last C.I.E. meeting at Zurich.

Most people will agree with Dr. Walsh that the lighting vocabulary needs tidying considerably. How are we to achieve this?

I think, sir, that you and I (and others holding similar positions) can do a great deal towards this. First, you as Editor can issue detailed instructions as to symbols and terminology to be used by writers of articles (a great many journals do this), and further, refuse to publish articles which contain terms incorrectly used. Secondly, I as a teacher can (and do) take scrupulous care over this question of vocabulary and units.

Then, surely, given time for a few die-hards to die off, we will eventually achieve our very desirable aim.

Northampton Polytechnic,
London. C. A. PADGHAM.

NEW PRODUCTS

Portable neon sign

A neon sign, each letter of which is detachable, so that the "message" can be completely changed within a few seconds, has been invented by a French electronics engineer, M. Robert Rousseau, and is to be marketed, both in the U.K. and overseas, by Winston Electronics, Limited. The neon-filled glass letters are activated by high-frequency radiation instead of high-voltage current.

The sign comprises a box, about 30 inches wide and 18 inches high, containing a radio circuit which emits the high-frequency signal via an aerial grid stretched over the front of the box. This grid is covered by a layer of black velvet to which the letters are attached by means of small pins fused to the glass tubing. The sign can support about 40 characters, is suppressed to prevent its causing radio interference, and has a built-in flashing device. The standard colour is green, although other colours (and other characters, including simple drawings) are obtainable to order, the current consumption is equivalent to that of a 100-watt lamp.

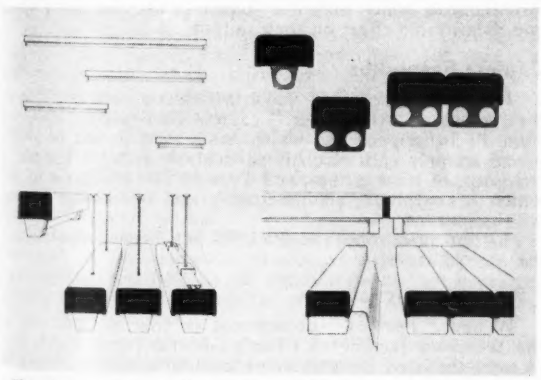
Advantages to which Winston Electronics draw attention include: long life—there being nothing to "burn out"; low maintenance costs—a damaged letter can be replaced for about ten shillings; and safety—there being no high voltage current.

Picture lighting reflector

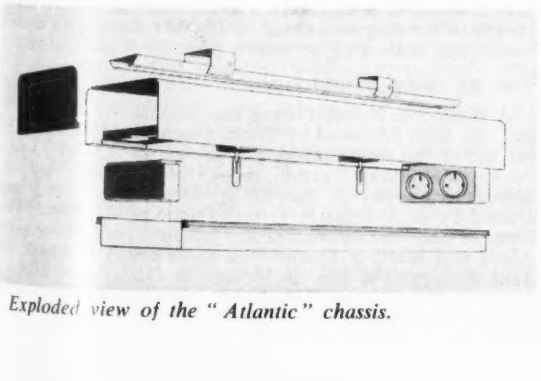
Linolite have introduced a new picture lighting reflector (SPL) of very small section. It is available in three sizes (8, 10½ and 13 inches) the smallest size taking the new 6 ins. double-ended tubular 25-watt lamp. The prices are 60s., 65s. and 70s. respectively.

Fluorescent fittings

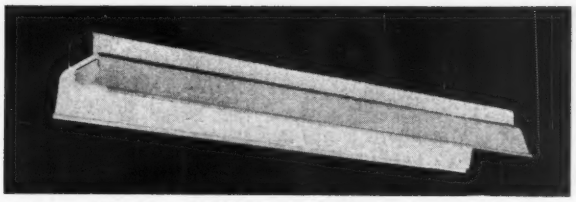
A new and flexible series of fluorescent lighting fittings known as the Atlas "Atlantic" range is announced by Thorn Electrical Industries, Ltd. Totalling nearly 400 different fittings of novel design, the range is derived from a series of basic components which can be pre-assembled to form fittings for almost every kind of industrial or commercial application.



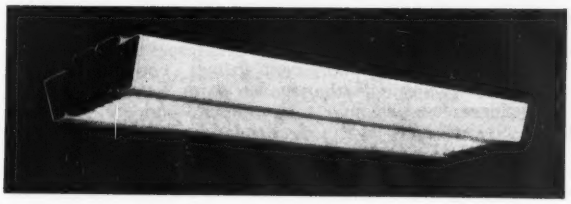
Showing some of the many different ways in which the "Atlantic" chassis can be used.



Exploded view of the "Atlantic" chassis.



Examples of type of fittings which can be made up in the "Atlantic" chassis. Above, single, twin or four lamp open-end slotted metal trough fitting. Below, four lamp fitting with double-banked fitting.



Chassis design is constant throughout the series, the only variable factor being length. Made in 2 ft., 4 ft., 5 ft., and 8 ft. sizes, each chassis can accommodate either one or two lamps with quick-start or switch-start control gear, and can be fixed either by rods, chains, or ceiling mounting. Special universal suspension with variable fixing centres can be provided with all fittings. Chassis units can be easily coupled side by side to form multiple tube fittings (i.e., two, four or six tubes) as desired.

A newly patented spring-loaded lampholder in white plastic enables bi-pin lamps to be used throughout. Flicker-shields are thus eliminated and the fittings can be placed end to end with a minimum dark area between. These lampholders also enable lamps to be fixed or removed from either end of the fitting single-handed.

Snap-on "Perspex" diffusers, either plain or louvred, can be supplied with any of the single or twin-lamp chassis units (except the 8 ft. size) and for double banked chassis. Different types of single and twin-lamp "Perspex" trough fittings are also obtainable. Metal trough reflectors for industrial applications are available in all sizes and are easily fitted by means of quick-release clamps. In addition to a standard high quality stove enamel finish, Atlas "Miracoat" anti-corrosive finish can be supplied on the metal trough fittings. Vitreous enamelled trough reflectors are also obtainable. Each fitting is supplied pre-assembled and pre-packed. Designed by John Reid, A.R.I.B.A., M.S.I.A., in association with the Atlas designers, the "Atlantic" range will enable entire lighting schemes to be based on the one family of fittings—a feature of great interest to architects, lighting engineers and contractors.

Trade Literature

A.E.I. LAMP AND LIGHTING CO., LTD., Mazda House, 44, Fitzroy Road, London, N.W.1.—Four selected range folders giving details and prices as follows: AF 102, Commercial Filament Lighting; AF 103, Industrial Filament and Discharge Lighting; AF 104, Commercial Fluorescent Lighting; AF 105, Industrial Fluorescent Lighting. Also a comprehensive catalogue, AL 113, giving full details and prices of lamps including fluorescent, electric discharge, projector, photographic, decorative, infra red, neon, flashlight, miners, etc.

BEST AND LLOYD LTD., Wattville Road, Handsworth, Birmingham, 21.—A well illustrated catalogue, No. 211, giving full details of contemporary lighting fittings including wall and pendant fittings for domestic use. Separate price list enclosed.

BETA MANUFACTURING CO., Poplar Works, Valley Road, Shipley, Yorks.—Leaflet giving details and price list of the new range of contemporary lighting fittings including attractive wall and ceiling fittings and floor standards.

BUSHELL AND SAWARD LTD., 11-13, Baron Street, London, N.1.—A brochure showing the latest contemporary table and standard lamps and shades, including separate price list.

CRYSELCO LTD., Kempston Works, Bedford.—Leaflet showing the latest tungsten and mercury round reflectors, sodium trough reflectors and a new type of angle floodlight unit including prices. Also a leaflet showing details and prices of "Perspex" and glass-sided pendant fittings.

EKCO-ENSIGN ELECTRIC LTD., 45, Essex Street, London, W.C.2.—Latest lamp catalogue giving details and prices of this company's lamps including general service, silverlight, softlight, candle, neon, tubular, projector, photoflood, flash, sodium, mercury, fluorescent, etc. Also a leaflet illustrating fluorescent fittings, control gear and accessories and a further leaflet giving details and prices of fluorescent fittings for commercial and industrial use.

FALK, STADELMANN AND CO. LTD., 91, Farringdon Road, London, E.C.1.—New well illustrated catalogue in colour containing contemporary lighting fittings including many new designs for domestic wall and ceiling fittings, table and floor standards with details and prices.

LINOLITE LTD., 118, Baker Street, London, W.1.—Leaflet No. 26, illustrating local lighting in industry including fluorescent and adjustable reflectors. Separate price list enclosed.

LOBLITE LTD., Third Avenue, Team Valley, Gateshead-on-Tyne, 11.—Well illustrated catalogue describing the new "Lindner" fittings designed by Prof. W. Wagenfeld including many designs of porcelain wall, ceiling and corner fittings.

PHILIPS ELECTRICAL LTD., Century House, Shaftesbury Avenue, London, W.C.2.—Two new booklets for flash photographers. The first, entitled "It's Easy With Flash," which covers the elementary principles of flash photography as well as hints and guides for the more experienced; the second, entitled "Perfection in a Flash," is a 72-page guide to modern flash photography and photoflood lighting, and costs 2s. 6d. per copy.

THE SUN ELECTRICAL CO. LTD., 118-124, Charing Cross Road, London, W.C.2.—Commercial lighting fittings list No. 764 includes a comprehensive description of the most popular of this company's lines for use in all commercial and industrial purposes as well as stage and ballroom equipment, time switches, signs and accessories.

THORN ELECTRICAL INDUSTRIES LTD., 233, Shaftesbury Avenue, London, W.C.2.—Three new brochures describing "Atlas" lighting. The first dealing with recessed troffers on a 2 ft. module; the second illustrating fully the new "Domino" system of fluorescent lighting designed by John Reid for imaginative lighting in modern architecture and the third introducing the new "Kitchenlight" designed specially for use in the most important room in the house.

TROUGHTON AND YOUNG (LIGHTING) LTD., The Lighting Centre, 143, Knightsbridge, London, S.W.1.—Leaflet No. TYL/11 illustrating a new range of lighting fittings for domestic use including wall brackets, ceiling fittings, table and floor standards. Prices given in each case.

Trade Notes

New showrooms

The A.E.I. Lamp and Lighting Co., Ltd. has recently opened two new showrooms; at 74, Waterloo Street, Glasgow and 26/28, Holloway Road, Birmingham.

The interior of the Glasgow showroom was designed by Basil Spence and Partners (J. Hardie-Glover, architect in charge). The requirements were for a simple shell which by its treatment would house exhibitions and not clash with individual displays. The walls and ceilings are therefore matt black which together with the use of "Invertrunking" at a height of 10 ft. gives greater flexibility of the lighting system than is usually found in lighting showrooms. The

reception area (illustrated) is off the main showroom; over this "Module" fittings are set in an acoustic tile ceiling.

The Birmingham showroom was designed by Robert Wetmore in conjunction with Leslie Goodey and occupies the space which was previously a Met-Vick showroom. It has been enlarged and the frontage has been redesigned.

Award to The Wakefield Company

The new general offices of The Wakefield Company, Vermilion, Ohio (described in *Light and Lighting* for October), were one of the winners in the 1956 "Best Place to Work" Award, presented annually for outstanding office design by the American publication *Management Methods*. Entries were judged on the basis of their ability to stimulate employee and executive productivity and morale through well-planned, well-integrated quarters. More than 100 separate entries were submitted. These awards were established in 1954 to support the publisher's belief that the environment in which men and machines operate has a direct and measurable effect on their output.

Capless flashbulbs

Philips Electrical Ltd. have introduced two additions to their range of "Photoflux" capless flashbulbs. They are Type PF5 (list price 1s.) which has a light output of 18,000 lumen-seconds and which is particularly suitable for taking snapshots of large groups, and Type PF5/97 (list price 1s. 1d.) which is made with a blue coating and is intended for use with colour.

The list price of Type PF1/97 has been reduced from 10d. to 9d.

"Perspex" signs

A new "Perspex" department is now in operation at the Wembley factory of Claude-General Neon Lights Ltd. to meet the need for greater production capacity created by the growing use of "Perspex" for sign making. The new department is housed in the new extensions to the Claudgen factory which were completed last autumn. The plant and tools installed in it include a routing machine with a cutter capable of rotating at a speed of 24,000 r.p.m. and a mobile hand-router with a cutter which turns at 16,000 r.p.m.

Film on lamp production

A thirty-five-minute feature film entitled "The Better to See" has been produced by Thorn Electrical Industries. The film shows the manufacturing processes of "Atlas" lamps and contains many "action shots" of the machinery and methods employed in the Thorn factories. Written and directed by S. T. Holmes, Group Publicity Manager, "The Better to See" was filmed chiefly at the Thorn factories at Enfield and Merthyr Tydfil. The commentary is spoken by Frank Phillips. The film (in 16 mm.) is available on loan by arrangement with the publicity department of Thorn Electrical Industries.

I.E.S. ACTIVITIES

Presidential Address

At the first meeting of the new IES session which took place at the Royal Institution on October 9, Dr. W. E. Harper took office as president. In his presidential address Dr. Harper reviewed the place of lighting in social history and concluded by stating three principles which he thought should govern the life of the Society.

Dr. Harper said that it is a function of history to correct the presumption that the achievements of any age are the achievements of that age alone. There is no part of modern life that does not stand in debt to the past; illuminating engineering, which at first sight may seem peculiarly a child of the twentieth century, has been fashioned down long years by diverse social forces.

The beginnings may be said to lie in the thirteenth, fourteenth and fifteenth centuries when the builders of many of our cathedrals used the power of light playing on proportioned and decorated stone to evoke profound emotional response. Even at the end of that period artificial light sources were primitive—and some of the craft guilds would allow their craft to be practised only by day. The first use of artificial lighting in mines is recorded at that time and the English glass industry, of particular interest to the lighting industry, became firmly established. Accepted thought forms, however, were still those of medieval scholasticism embodying the science of Greece.

Conscious scientific effort was, however, on the move and with the seventeenth century came the Royal Society and the first man of science of all time, Newton, who first paper was on light.

By the eighteenth century commerce and industry were expanding and slowly people were being drawn from the land to the towns to meet the needs of developing trade. Street lighting became necessary and gas began to be used for lighting factories. The increase in overseas trade and movement of ships led to the need for navigational aids at night.

Of the many factors that interacted to produce the Industrial Revolution none was more powerful than the changed relation betwen science and industry; from now on science was to respond increasingly to the demands of industry, and industry was to apply the discoveries of science. Conditions of life and employment led to much suffering but the standard of living rose progressively. Social legislation to rectify the worst features of industrial and communal life was introduced and the Factory and Mines Inspectorates were set up.

As each component of the new industrial society was fashioned so, unconsciously, it created a demand for artificial lighting matched to its characteristics; an organised lighting profession was still far off but social pressure was operating to that end.

Even as gas lighting was being established, work that would result years later in its supersession was in hand. In 1809 Davy demonstrated his arc lamps and later, at the Royal Institution Faraday elucidated the principles of electromagnetic induction and opened the way to the electricity supply industry of to-day. In 1878-9 Swan and Edison produced successful lamps and the electric lamp industry was born. Throughout these years of swift advance fundamental scientific studies, particularly those by Clerk-Maxwell, Ramsay and J. J. Thomson, that were to serve the practical lighting demands of the future had gone forward on a wide front. In the field of light measurement valuable contributions were made by Harcourt, Ritchie and Preece.

So, slowly, scientific research and industrial development forged tools to meet the demands for better lighting. Lighting as a service to society began to be appreciated and a lighting profession was demanded.

The period from 1900 up to the present might be called the years of achievement and opportunity. In 1909 the I.E.S. was founded and lighting instead of being a by-product of the gas and electricity industries became a formative power in shaping the social life of the people. Official recognition of the importance of good lighting gathered quickly in the early days of the new century and many investigations were carried out. After the 1914-18 war there were great social changes and in response to social demands advances were made in all directions. Advances in road transport brought an imperative demand for a new order in street lighting; air travel became established and the fundamentals of airport lighting had to be investigated; the production demands of industry called for higher levels of illumination and attention to problems of glare. To translate these, and many other, studies into practice, new tools were required and supplied—new light sources, new methods of controlling light, new glasses, new metals, new paints, etc. Technical resources have expanded until the gap between demand and response has been bridged and to-day there is little which is not technically possible.

The present danger is that in our technical competence we may become complacent in outlook and approach. Modern life confronts the lighting profession with vivid claim and opportunity. In its contemporary context, said Dr. Harper, there are three principles which should mark the life of the Society.

First is the principle of catholicity. A temptation which lies close to professional societies is that of becoming ends in themselves, exclusive and self-satisfied in outlook. Apprehending this danger the Council is now revising the constitution of the Society to widen its objects and scope. We have to recognise, said Dr. Harper, that modern lighting comprehends more than its technicalities and we must set ourselves to secure this wider understanding.

The second principle is that of authority. There is a growing tendency to transfer to Government committees the technical authority properly held by professional societies and institutions alone. This authority is not to be conferred by appointment, for it derives from the knowledge and experience lodged in these societies and institutions by reason of the wide experience of their members. Where an authoritative judgment is required on any aspect of lighting, then the opinion of this Society should carry greater weight.

Finally there is the principle of responsibility. For good and for ill our professional activities, individual and collective, are woven into the social fabric with consequences ineradicable from the history of our times beneath whose judgment we most surely stand. Few societies have so much of man's welfare and happiness in their keeping as has this Society. It is a high privilege and a great social responsibility which will be carried not by the exercise of our technical strength alone, but as we rise above personal and parochial interests to serve the community together as a Society single in purpose.

Leicester Centre

The first meeting of the new session of the Centre was held on September 24. The new chairman, Mr. C. P. Weston, presided. The meeting took the form of four short papers by members: "Some notes on the lighting installation of a new local warehouse and offices," by Mr. C. P. Weston, "The lighting of a motor-car showroom," by Mr. R. C. Willdey, "A technical consideration of discharge lamp design," by Mr. R. F. Weston, and "Two sports lighting installations," by Mr. A. E. Bird. These subjects each having a local background were most interesting and provided matter for discussion.

FORTHCOMING EVENTS

LONDON

November 13th

Sessional Meeting.—"The Starting of Fluorescent Lamps," by D. T. Waigh and L. C. Wiltshire. (At the Federation of British Industries, 21, Tothill Street, S.W.1.) 6 p.m.

November 27th

"Blackpool Illuminations," by H. Carpenter. (At the Lighting Service Bureau, 2, Savoy Hill, W.C.2.) 6 p.m.

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CENTRES AND GROUPS

November 1st

GLASGOW.—"Design To-day," by A. Maynard. (At the Institution of Engineers and Shipbuilders in Scotland, 39, Elmbank Crescent, Glasgow, C.2.) 6.30 p.m.

NOTTINGHAM.—"Road Vehicle Lighting," by J. H. Nelson. (At the Electricity Service Centre, Smithy Row, Nottingham.) 5.30 for 6 p.m.

November 7th

EDINBURGH.—"Design To-day," by A. Maynard. (At the Y.M.C.A., 14, South St. Andrew Street, Edinburgh.) 6.15 p.m.

NEWCASTLE-UPON-TYNE.—"Television Studio Lighting Equipment," by K. R. Ackerman. (At the Large Lecture Theatre, Grey Hall, Department of Electrical Engineering, King's College, College Road, Newcastle-upon-Tyne, 1.) 6.15 p.m.

SWANSEA.—"Lighting in Buildings—Training and Practice," by Derek Phillips. (Joint meeting with the South Wales Institute of Architects.) (At the Demonstration Theatre of The South Wales Electricity Board, The Kingsway, Swansea.) 6.30 p.m.

November 8th

BIRMINGHAM.—Ladies' Night. (At the Botanical Gardens.)

CARDIFF.—"The Use of Coloured Light," by H. Hewitt and C. R. Passmore. (At the South Wales Electricity Board's Demonstration Theatre, The Hayes, Cardiff.) 7 p.m.

November 12th

SHEFFIELD.—"Trends in Interior Installations and Designs," by H. H. Ballin. (At the Medical Library, The University, Western Bank, Sheffield, 10.) 6.30 p.m.

November 15th

MANCHESTER.—"School Lighting, Part II." (At the Demonstration Theatre of the North-Western Electricity Board, Town Hall, Manchester.)

November 20th

GLOUCESTER AND CHELTENHAM.—"Road Vehicle Lighting," by K. J. Jones. (At the Fleece Hotel, High Street, Cheltenham.) 6.30 p.m.

LIVERPOOL.—"Architects' Views," by J. G. R. Sheridan. (At the Liverpool Passenger Transport Office, 24, Hatton Garden, Liverpool.) 6 p.m.

November 21st

NORTH LANCASHIRE.—"School Lighting, Part I." (a) "Daylight Considerations," by G. S. Pester; (b) "Artificial Light," by J. Blackie. (At the Demonstration Theatre, The North-Western Electricity Board, 19, Friargate, Preston.) 7.15 p.m.

November 23rd

BIRMINGHAM.—"Modern Applications of Plastics to Lighting Fittings," by P. H. Collins. (At Regent House, St. Phillip's Place, Colmore Row, Birmingham.) 6 p.m.

CARDIFF.—Annual Dinner Dance. (At St. Mellons County Club.)

GLASGOW.—Luncheon Meeting in Georgic Restaurant, Union Street, Glasgow. 12.30 p.m.

LEICESTER.—Social Evening. (At the Coronation Hotel.)

November 26th

BATH AND BRISTOL.—"Lighting for Inspection," by H. E. Bellchambers. (At the Royal Hotel, Bath.) 7 p.m.

LEEDS.—"My Most Interesting Lighting Job." Four short papers by S. Addison, J. W. Bessant, K. Graham, H. Laycock.

November 28th

TRANSVAAL.—"Lighting of the New Johannesburg Railway Station," by H. N. Joubert and C. Parrymore. (At Room 95, Public Library, Johannesburg.) 8 p.m.

Personal

Holophane Ltd. announce changes in their area sales engineering organisation: MR. W. H. DODGSON, who has been lighting sales engineer for Nottingham since 1954, now moves to London, where he will represent the company's interest operating from Westminster. MR. E. J. MARA, formerly an assistance engineer at the company's head office, has been appointed sales lighting engineer for the Nottingham area. MR. K. MARSHALL has been appointed sales lighting engineer for the Yorkshire area. He was formerly with the G.E.C. Ltd.

MR. S. G. ELLIOTT-SMITH has been elected to the board of Cryselco Ltd. and appointed managing director in succession to the late MR. H. A. DEACON. MR. H. ELLIOTT has been appointed sales manager of Cryselco Ltd.

MR. C. DYKES BROWN has been appointed manager of the Illuminating Engineering Division of the General Electric Company's Lighting Fittings Department at Magnet House, Kingsway, London.

The A.E.I. Lamp and Lighting Company announce the appointment of MR. B. J. ROBINSON to the post of Regional Publicity Assistant for their Midland Region. He will also be responsible for the new A.E.I. Lamp and Lighting showroom, which has opened at the company's Midland Region Headquarters at 26-28, Holloway Head, Birmingham 1. A.E.I. also announce that MR. JOHN B. HENDERSON has been appointed to the new position of Regional Publicity Assistant for Scotland and Northern Ireland and in charge of the new showroom at Waterloo-street, Glasgow.

The Stanton Ironworks Co., Ltd., announce that MR. R. E. STEVENSON, who has been area sales representative in the South Midlands for a number of years, has been appointed to the position of Cardiff manager to replace MR. R. G. SAUNDERS, who has retired.

The Council of the British Electrical Development Association announces with regret that MR. V. W. DALE, Companion I.E.E., will relinquish his position as director and secretary of the Association as soon as his successor has been appointed and ready to take over. Mr. Dale, who is approaching the completion of 50 years in the electricity supply industry, is retiring on account of health considerations.

Fellowship of the I.E.S. has been awarded to MR. J. S. MCCULLOCH, of Gregory and Partners, consulting engineer of Newcastle-upon-Tyne, and to MR. D. W. DURRANT, deputy manager of the Lighting Fittings and Illuminating Engineering Departments of the General Electric Co. Ltd.

The following members of the I.E.S. have successfully applied for inclusion in the I.E.S. Register of Lighting Engineers: MR. B. CLARKE, Eastern Electricity Board, Luton; MR. H. LAYCOCK, Philips Electrical Ltd., Leeds; MR. G. J. PEAT, Blacklers Stores Ltd., Liverpool; MR. J. F. PICKUP, British Luma Co-op Electric Lamp Society Ltd., Glasgow.

The I.E.S. Council announces that the Leon Gaster Memorial Premium for 1956, awarded for the most outstanding paper presented to and published by the Society during the year, has been awarded to MR. D. W. DURRANT for his paper entitled "Decorative Lighting—A Designer's Approach," which was presented at the Society's Summer Meeting held at Harrogate in May.

DEREK PHILLIPS, author of the article entitled "Lighting in Service Ceilings" which appeared in the October issue and which has received some very favourable comments, is consultant architect to the A.E.I. Lamp and Lighting Co., Ltd.

Book Review

"Elementary Technical Electricity," by L. T. Agger, published by Longmans, Green and Co., pp. viii + 268; 149 figs. Price 9s.

This book is intended as an introduction to technical electricity; it also includes three short chapters on mechanics and heat. That the latter subjects are disposed of so briefly shows that it is only a primer, and the title indicates the standard. The student concerned with lighting should be at least up to this level of electro-technology before starting his lighting course. However, for junior technical schools or S1 electrical science course it would be admirable.

The book is very well produced. This is a second (revised) edition, and the number of new impressions since it was first published in 1931 testifies to its deserved popularity.

S. S. B.

POSTSCRIPT By "Lumeritas"

LIKE all other members of the I.E.S., I recently received a letter from the President regarding a proposal to change the name of this body to The Lighting Society. I welcome this proposal wholeheartedly for I have long felt that the existing name is too restrictive and is calculated to deter, rather than encourage, new members from the various classes of people who have special interests in lighting though not in its purely "engineering" aspects. The Society will soon be celebrating its golden jubilee, and the passage of time that has brought it so near to this event has also inevitably diminished the number of surviving founder members who participated in the original discussions as to an appropriate name for the Society. They, however, will remember that, as recorded in early issues of this journal (then called *The Illuminating Engineer*), no little difficulty was experienced in reaching a decision, and when the present name was selected it was not with the conviction that it was ideal. Similar difficulty was experienced before the foundation of the American Society, which preceded our own by three years. After all, we do not now have "illuminating engineers"—we call them "lighting engineers"; and all the non-engineers who are interested in lighting either refer to it as such or, unfortunately, as "illumination." Now is the time to modernise and rationalise the title of the Society, and I shall be surprised if this is not the view of a substantial majority of members.

I HAVE been reading an article in the August-September issue of the *Dispensing Optician*, chiefly because it has a prefatory note mentioning modern lighting. The article is written by an ophthalmic surgeon; it is entitled "Understanding Glaucoma," and it has also been published in *Health Horizon*. This introductory note is set in italics, and this is what it says: "Two factors are mainly responsible for the degree of 'eye-consciousness' which to-day influences the man in the street. One is the amount of concentrated paper work which modern business methods demands. The other is modern lighting in shops and offices, particularly that type known as fluorescent, which is often thought to be a cause of eyestrain."

Now, there is not a word in the article itself to connect it with the "factors" referred to in the prefatory note. It is nowhere suggested that these factors may have any bearing on the incidence of glaucoma (a condition characterised by excessive intra-ocular pressure and which often leads to blindness), the actual cause of which is stated to be unknown. What, then, is the reason for the prefatory note? It is not relevant but merely serves to sow suspicion of modern lighting in the minds of readers. It amounts to preferring a charge and letting it stand without offering any evidence in support of it. It seems likely that this note is an editorial addition for which the author of the article has no responsibility. Whatever its source, it should not have been associated with the article about glaucoma. In fact, it should not have been published at all without indicating upon what facts its statements are based. Who can be in a position to know "the degree of eye-consciousness" of "the man in the street" and the factors mainly responsible for it? To get this knowledge some sort of social survey would be needed; clearly it could not be got from ophthalmic patients who, in this matter, are not a representative sample of the man in the street.

SOME weeks ago a popular "weekly" reported that the Chief of Police in Holbaeck, Denmark, has had ochre-coloured [presumably sodium] street lights installed because they make women's make-up look so hideous that all outdoor flirtations are discouraged. Says the journal concerned: "Is this the answer to what is called London's vice problem?" I think not. There has been no lack of protests against sodium street lighting on account of its denaturing of the human visage and, perhaps, if the cynic who said "All women are alike in the dark" had lived in modern times he might have added: "And all women are jaundiced in sodium light." But, then, these uniformities predicated of Juliets are also true of Romeos. Anyway, as one sage (Lucretius) has put it: "Men . . . blinded by passion . . . attribute to the beloved those advantages which are not really theirs . . . the black is a brune, the filthy and rank has not the love of order; the cat-eyed is a miniature Pallas, the stringy and wizened a gazelle"; and so on. "It were tedious," continues the sage, "to attempt to report other things of this kind," but, knowing much of the nature of things, he would not have believed that sodium lighting might discourage flirtations. Rather—to his catalogue of the "beauties" that only the eye of the ardent beholder can see—he might have added, "the sodiumed 'priestesses' of Venus are gilded lilies."

THIS notion of the power of modern light sources to abrogate natural human functions reminds me of a question put to me some time ago by a local Medical Officer of Health. "Is it true," he asked, "that fluorescent lighting induces sterility?" With Washingtonian frankness I replied, "Sir, I cannot tell a lie; it does not do so." Perhaps it is a pity that it doesn't—that it contains none of the ionising radiations which can constitute a genetic hazard and, alas, not even enough "erythemal" radiation to give us the sun-tan we didn't get at the seaside this year! If it did induce sterility, what a much less painful way it would be of dealing with the problem of over-population than is Nature's way—which is pestilence, and witless man's way—which is wars!